GOES-R SERIES PRODUCT DEFINITION AND USERS' GUIDE

(PUG)

APPENDIX X: ISO SERIES METADATA

March 23, 2021

Revision 2.3

U.S. Department of Commerce (DOC)
National Oceanic and Atmospheric Administration (NOAA)
NOAA Satellite and Information Service (NESDIS)
National Aeronautics and Space Administration (NASA)

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GOES-R SERIES PRODUCT DEFINITION AND USERS' GUIDE

(PUG)

APPENDIX X: ISO SERIES METADATA

Signature on File_____   **11/20/2017**

Jim Valenti   Date

NOAA

GOES-R Ground Segment Project Manager

CHANGE RECORD

ISSUE	CCR #	DATE	PAGES AFFECTED	DESCRIPTION
Rev. 1.0	CCR-03240	03/02/2017	All	CDRL SE-16 under Government Control. Harris DCN 7035538 PUG APX Rev E has been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 1.0.
Rev. 1.1	CCR-03332	10/27/2017	All	CDRL SE-16 under Government Control. Harris DCN 7035538 PUG APX Rev F has been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 1.1.
Rev. 2.0	CCR-03461	11/01/2018	All	CDRL SE-16 under Government Control. Harris DCN 7035538 PUG APX Rev G has been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 2.0
Rev. 2.1	CCR-03511	08/08/2019	All	CDRL SE-16 under Government Control. Harris DCN 7035538 PUG APX Rev G.1 and G.2 have been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 2.1. (Includes SW Baselines DO.07.01 and DO.07.02.)
Rev. 2.2	CCR-03554	12/17/2019	All	CDRL SE-16 under Government Control. Harris DCN 7035538 PUG APX Rev H and H.1 have been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 2.2. (Includes SW Baselines DO.08.00.00 and DO.08.01.00.)
Rev. 2.3	CCR-03632	03/23/2021	All	CDRL SE-16 under Government Control. L3Harris DCN 7035538 PUG APX Revs J, J.1 and J.2 have been placed under Gov. GS control as GOES-R Series 416-R-PUG-APX-0350 Rev 2.3. (Includes SW Baselines DO.09.00.00 and DO.09.01.00.)

The document version number identifies whether the document is a working copy, final, revision, or update, defined as follows:

- **Working copy or Draft:** a document not yet finalized or ready for distribution; sometimes called a draft. Use 0.1A, 0.1B, etc. for unpublished documents.
- **Final:** the first definitive edition of the document. The final is always identified as Version 1.0.
- **Revision:** an edition with minor changes from the previous edition, defined as changes affecting less than one-third of the pages in the document. The version numbers for revisions 1.1 through 1.9, 2.1 through 2.9, and so forth. After nine revisions, any other changes to the document are considered an update. A revision in draft, i.e. before being re-baselined, should be numbered as 1.1A, 1.1B, etc.
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PRODUCT DEFINITION AND USER'S GUIDE (PUG)
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FOR
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE
R SERIES (GOES-R) CORE GROUND SEGMENT
CONTRACT NO: DG133E-09-CN-0094
DOCUMENT CONTROL NUMBER: 7035538
CDRL SE-16
REVISION J.1
01 JUNE 2020

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NOAA LIAISON OFFICE/NASA GSFC
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PRODUCT DEFINITION AND USER'S GUIDE (PUG)

APPENDIX X: ISO SERIES METADATA

FOR
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE R SERIES (GOES-R) CORE GROUND SEGMENT

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RECORD OF CHANGE

REVISION	DATE	DESCRIPTION
C	06 December 2013	Post-CDR Interim Release PTR-9218 Delivery_SE-16_Product Definition and User's Guide (PUG) Release Update Rev C 1) Co-locate all ISO series metadata into a single document to improve usability of the PUG
C.1	05 December 2014	Post-CDR Interim Release Vol 1, Main: • Added FITS format section (SUVI) Vol 2, L0: • Minor editorial changes Vol 3, L1b: • Revised Space Weather and Solar instrument sections • Co-located Instrument Calibration Data with instrument section Vol 4, GRB: • Revised Space Weather and Solar instrument sections • Corrected APID list Vol 5, L2+: • Combined Volumes 5A and 5B • Added section for Latitude/Longitude grid (Radiation products) • Added Appendix for dynamic source data • Miscellaneous changes to CMI product Appendix X, ISO Series Metadata: • Revised L1b, L2+, Instrument Calibration Data sections PTR-12388 UMB_Delivery_SE-16_ Product Definition and User's Guide (PUG) Release Update Rev C.1 • Incorporates PTR-7028, PTR-7556, PTR-7557, PTR-7553, PTR-8055, PTR-8742, PTR-9027, PTR-9518, PTR-11701 • Combined Vol 5A and Vol 5B into a single volume • Rearranged major sections of the document (consolidated File Naming conventions, consolidated APID lists, etc.), for usability PTR-7028

REVISION	DATE	DESCRIPTION
		Update Cumulative ERB/PCRB Changes in Next Rev of Document • ERB: delete the Rainfall Rate Coefficient Algorithm • PCRB: change GLM Lightning Event Peak L1b/GRB update • PCRB: change Radiation Grid from ABI Grid to Latitude/Longitude PTR-7556 Deferred Comments from Rev. B.2 Peer Review • Incorporate comments deferred from Revision B.2 Peer Review PTR-7753 SE-16: Updates to PUG Rev C for next Release • Fixed MAG L1b OMAS/GRB/PD periodicity PTR-8055 SE-16 PUG BCR # 127 + BCR #129 + BCR 124 + BCN_120 ATP for NcML/Product Definition for non-ABI Sensors + BCN_149, BCR 115 Update GLM L2 NcML + BCR 119 + BCR #127 and 129 (IPS and Product Set 1 NcML Corrections) • BCR#127: incorporated IPS Product NcML corrections • BCR#129: incorporated IPS and Product Set 1 NcML corrections • BCR#124: changed SUVI, SEISS, MAG NcML • BCN_120: NcML/product definition for non-ABI instruments • BCN_149 / BCR#115: updated GLM L2+ NcML definition • BCR#119: changed SUVI GLM INR report design • ECP-9a: added aggregation criteria for Geomagnetic Field, Solar Flux: X-Ray products • BCR#212: incorporated Product Set 2 NcML corrections PTR-8742 SE-16 PUG - Scheduled Science Instrument Products definitions • Updated SUVI, EXIS, SEISS, MAG, GLM product definitions PTR-9027 SE-16 PUG - Evaluate Customer Comments Against Rev B.2 • Incorporated customer comments not previously addressed in PUG Rev C PTR-9518 SE-16 PUG, Evaluate Customer Comments from Rev C • Incorporated customer comments against PUG Rev C PTR-11701 SE-16 PUG - Update for BCR # 227, Non-ABI product Corrections

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REVISION	DATE	DESCRIPTION
		• Incorporated non-ABI Product NcML corrections
D	13 May 2015	PTR-7557 UMB_Delivery_SE-16_Product Definition and User's Guide (PUG) Release Update Rev D • Incorporate customer comments against PUG Rev C.1 PTR-13600 • SE-16 PUG - Miscellaneous Corrections Appendix X • New content – L0 and GRB Info ISO Series Metadata Vol 2, L0 • Restructured to be consistent with other volumes Vol 3, L1b • New content – dynamic and semi-static processing parameters Vol 4, GRB • New content – GRB Information Vol 5, L2+ • New content – dynamic and semi-static processing parameters
D.1	11 August 2015	PTR-14093 • Change 132.8 Angstroms wavelength to 131.2 Angstroms in SUVI documentation PTR-14107 • Update various L2 product lineage issues PTR-13638 • Update document for ECP-023 new CONUS center points PTR-14388 • WR 757: SE-16: CMI – Update PUG to change scaling of band 7 to a max brightness temp of 400K
D.2	24 March 2016	PUG release aligned with PC DO.03.00.00 software baseline. PTR-14663 • SE-16 PUG, Evaluate Customer Comments from Rev D PTR-15294 • SE-16 PUG, Add GRB-INFO-STATIC description PTR-15324

REVISION	DATE	DESCRIPTION
		• SE-16 PUG - Misc. Updates to Sync with GS File Naming Conventions
E	15 June 2016	PUG release aligned with PC DO.04.00.00 software baseline. PTR-16585 • SE-16 PUG - Miscellaneous Corrections PTR-16442 • WR 1949: GLM appears to have Timing Artifacts (PUG Update) PTR-15605 • WR 813: Space Weather products' enhancements requested by NCEI (SE-16 PUG) • Add SEISS MPS-LO energy bounds/levels to differential_flux_energy_band_label variable value PTR-15580 • WR 1697: SE-16 PUG - Rainfall Rate Product DQF Valid Range is Incorrect PTR-15194 • WR 1177: SE-16 Modify Product Definition User's Guide for expanded ABI L1b Radiance Limits
E.1	4 November 2016	PUG release aligned with PC DO.04.02.00 software baseline, except where otherwise noted. PTRDOC-15878 DO.05.00.00 • WR 1552: SE-16 PUG - ABI L1b Instrument Calibration Data - Number of detector rows discrepancy PTRDOC-16363 • WR 2261: SE-16 PUG - Provide documentation for CAL INR data file structures PTRDOC-16387 DO.05.00.00 • WR 2218: SE-16 PUG - There are no ABI CCR results in the PM Generated ABI INR Report PTRDOC-16397 DO.05.00.00 • WR 1937: SE-16 PUG - GLM L2+ product metadata errors PTRDOC-16639 DO.05.00.00 • WR 1698: SE-16 PUG - Sea Surface Temperature Fill Value incorrect PTRDOC-16911 DO.05.00.00

REVISION	DATE	DESCRIPTION
		• WR 2961: SE-16 PUG - Update to clarify Rainfall Rate metadata PTRDOC-16936 • WR 2566: SE-16 PUG - Add Derived Motion Winds PQI and Diagnostic Intermediate Products to the PUG PTRDOC-17008 • WR 2749: SE-16 PUG - Update to reflect 2 minute EXIS L0 LZSS file aggregation time PTRDOC-17088 • WR 2874: SE-16 PUG - Correct File Names of Instrument Calibration Files Produced PTRDOC-17123 • WR 1739: SE-16 PUG - SUVI Instrument Calibration File Names PTRDOC-17254 • WR 2962: SE-16 PUG - CMI Coefficients update-ADR 143 PTRDOC-17416 • WR 3058: SE-16 PUG - SUVI scale factors in products do not match scale factors in the PUG PTRDOC-17661 • WR 3274: SE-16 PUG - Update to Align with XTCE Database v6.3.005A PTRDOC-17818 DO.06.00.00 • WR 2260: SE-16 PUG - Derived Motion Winds (DMW) Wind Direction: Incorrect Direction

E.2	30 March 2017	PUG release aligned with GOES-R Ground Segment Product Capabilities (PG, PD, PM) software baselines, as follows:
		    DO.04.04.00: April 2017
		    DO.05.00.00: July 2017
		    DO.06.00.00: September 2017 (TBR)
		
		PTRDOC-17880 DO.05.00.00 Vol 5, Table 5.1.6.4-1.
		• WR 3383: SE-16 PUG - Changes for Expansion of CMI range to match DO.04 Rad-ADR 154
		
		PTRDOC-17887 DO.04.04.00 Vol 3, Section 5.0.1; Vol 4, Section 7.0.1; Vol 5, Section 5.0.1
		• WR 3483: SE-16 PUG - add explanation/instructions for converting 'seconds since epoch' to standard date/time

REVISION	DATE	DESCRIPTION
		PTRDOC-17995 DO.06.00.00 Vol 3, Table 5.3.2.5.1-11; Vol 4, Table 7.4.2.5.1-11. • WR 3438: SE-16 PUG - Fix Incorrect Flag Definition in EXIS Files - ADR 159 PTRDOC-18023 DO.06.00.00 Vol 5, Table 4.3.7-2. • WR 2291: SE-16 PUG - GRIP is not showing full SRB image on GOES WEST PTRDOC-18057 DO.05.00.00 Vol 3, Sections D.7, D.8 and D.9. • WR 3554: SE-16 PUG - Provide documentation for [CAL] INR data file structures (ABI, GLM, SUVI) PTRDOC-18090 DO.06.00.00 Vol 3, Section 5.1.4.1. • WR 3433: SE-16 PUG - Include pixels with under-saturated sample contributors in ABI Sample Outlier files PTRDOC-18144 DO.06.00.00 Vol 5, Table 5.1.7.6-2. • WR 3076: SE-16 PUG: DMW Output File is not CF Compliant-ADR 139 (PUG Changes) PTRDOC-18158 DO.06.00.00 Vol 3, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.2. • WR 3078: SE-16 PUG: EXIS - Add total number of valid SPS measurements used - ADR 148 PTRDOC-18191 DO.05.00.00 Vol 3, Table 5.3.1.5-2; Vol 4, Tables 7.4.1.5.1 and 7.4.1.5.2. • WR 3568: SE-16 PUG: Revise EXIS EUVS-C Cadence - ADR 183 (PUG Updates) PTRDOC-18225 DO.05.00.00 Vol 3, Sections D.4 and D.5. • WR 3324, 2989: SE-16 PUG - Update Documentation for MAG, SEISS CAL INR data file structures PTRDOC-18228 DO.06.00.00 Vol 3, Table 5.3.2.5-2; Vol 4, Table 7.4.2.5.2. • WR 3571: SE-16 PUG: Add SUVI roll angle to EXIS XRS - ADR 147 (PUG Changes) PTRDOC-18259 DO.06.00.00 Vol 5, Table 5.21.6-2. • WR 3222: SE-16 PUG - Land L2: FSC Metadata Issues-ADR 167 PTRDOC-18406 DO.06.00.00 Vol 3, Table 5.5.1.5-2; Vol 4, Tables 7.6.1.5.1 and 7.6.1.5.2.

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		• WR 3429: SE-16 PUG - MAG Add IB and OB measurements in 4 coord frames-ADR 145 PTRDOC-18441 DO.04.04.00 Vol 3, Table 5.1.3.6.3-2; Vol 4, Table 7.1.3.6.1.1-2. • WR 3804: SE-16 PUG: Bad Radiance-to-Brightness-Temp Conversion Coeffs PTRDOC-18608 DO.04.04.00 Vol 5, Table A.2-1, Section E.1. • WR 1264: SE-16 PUG: Change DMW Intermediate Product Filename (Data Short Name) PTRDOC-18646 DO.05.00.00 Vol 3, Tables 5.3.1.5-2, 5.4.4.5-1, 5.4.4.5-2, 5.4.4.5.2-4 and 5.4.6.2-1; Vol 4, Tables 7.4.1.5.1, 7.4.1.5.2, 7.5.4.5.1, 7.5.4.5.1.2-4 and 7.5.4.5.2. • WR 3918: SE-16 PUG: Removing Hyphens in EXIS and SEIS Vars and Attrs-ADR 207
F	16 June 2017	PTRDOC-18154 DO.06.00.00 Vol 3, section 5.0.2; Vol 4, section 7.0.2; Vol 5, section 5.0.2 • WR 3725: SE-16 PUG - Add description of unsigned integer processing PTRDOC-18519 DO.06.00.00 Vol 3, Table 5.3.1.5-2, Table 5.4.4.5-2; Vol 5, Table 5.10.6-2 • WR 3897: SE-16 PUG: Variable missing from XRS and SGPS files- ADR 211 PTRDOC-18813 DO.06.00.00 Vol 3, Table 5.2.1.5.1-2, section 5.2.1.5.2, Table 5.2.1.5.4-5, Table 5.3.1.5-2, Table 5.3.1.5.2-7, Table 5.3.2.5-2, Table 5.3.2.5.1-15, Table 5.4.1.5-2, Table 5.4.1.5.2-9, Table 5.4.2.5-2, Table 5.4.2.5.2-5, Table 5.4.3.5-2, Table 5.4.3.5.2-6, Table 5.4.4.5-2, Table 5.4.4.5.2-6, Table 5.5.1.5-2, Table 5.5.1.5.2-3; Vol 4, Table 7.3.1.5.1.2-8, Table 7.3.1.5.2, Table 7.4.1.5.1.2-7, Table 7.4.1.5.2, Table 7.4.2.5.1.1-15, Table 7.4.2.5.2, Table 7.5.1.5.1.2-9, Table 7.5.1.5.2, Table 7.5.2.5.1.2-5, Table 7.5.2.5.2, Table 7.5.3.5.1.2-6, Table 7.5.3.5.2, Table 7.5.4.5.1.2-6, Table 7.5.4.5.2, Table 7.6.1.5.1.2-3, Table 7.6.1.5.2 • WR 4164: SE-16 PUG: Space weather eclipse_flag flags do not capture all possible states PTRDOC-18819 DO.06.00.00 Vol 4, section 4.1, section 4.3 • WR 4139: SE-16 PUG: GRB Default Modem Configuration - QPSK

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		PTRDOC-18879 DO.06.00.00 Vol 4, section 2.0, section 5.0, section 6.0, section 6.2.6.3, section 7.1.3.6, section 7.3.1.5 • WR 4179: SE-16 PUG: ABI L1b metadata sent prior to end of scene in GRB PTRDOC-18890 DO.06.00.00 Vol 4, Table A • WR 3511: SE-16 PUG: Add statement on CCSDS reserved APIDs to the PUG PTRDOC-18907 DO.06.00.00 Vol 3, section 5.3.1.1; Vol 4, section 7.4.1.1 • WR 3257: SE-16 PUG: Resolve Time Stamp Error in EXIS Files-ADR 158 PTRDOC-18910 DO.06.00.00 Vol 3, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.1, Table 7.4.1.5.2 • WR 4205: SE-16 PUG: EXIS EUVS long name corrections-ADR278 PTRDOC-18951 DO.06.00.00 Vol 3, Table 5.6.2.2-1 • WR 3407: SE-16 PUG: GLM Background Image Metadata Differences from PUG PTRDOC-18955 DO.06.00.00 Vol 1 – 5, Appendix X, several sections and tables • WR 4263: BCR_591 ATP for ECP-029, SE-16: ECP-029 - Update Product Users Guide (PUG) for Mode 6 functionality PTRDOC-19131 DO.07.00.00 Vol 3, Table 5.2.1.1-1, Table 5.2.1.5.3-1, Table 5.2.1.5.4-2, Table A.1; Vol 4, Table 7.3.1.1-1, Table 7.3.1.5.1.1-1, Table 7.3.1.5.1.2-2 • WR 4023: SE-16 PUG: SUVI short exposure time - Long term fix - ADR 199 PTRDOC-19350 DO.06.00.00 Vol 3, Table 5.3.1.5.2-3, Table 5.3.2.5.1-3; Vol 4, Table 7.4.1.5.1.2-3, Table 7.4.2.5.1.1-3 • WR 4540: SE-16 PUG: EUVS and EXIS Processing and Data Quality Flag Meanings
F.1	29 November 2017	PTRDOC-19542 DO.06.00.00 Vol 5, Table 4.3.6, Table 4.3.7-2, Table 4.3.7-3 • WR 4182: SE-16 PUG: Displaced full disk Radiation data, Displaced CONUS radiation data - ADR 241, 242 PTRDOC-18158 DO.06.00.00 Vol 3, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.1; Vol 4, Table 7.4.1.5.2 • WR 3078: SE-16 PUG: EXIS - Add total number of valid SPS measurements used - ADR 148

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		PTRDOC-19760 DO.06.00.00 Vol 3, Table D.6-1 • WR 4709: SE-16 PUG: Incorporate GLM CalINR Tech Memo Rev A Changes (GLM CDRL-79 Rev H) PTRDOC-20567 DO.06.00.00 Vol 3, Table D.2-1 • WR 3812: SE-16 PUG: Incorporate SUVI CalINR Tech Memo Changes - SUVI CDRL-80 Rev G PTRDOC-18521 DO.06.00.00 Vol 4, Section 4.4.2.1; Vol 4, Figure 4.4.2.1 • WR 3904: SE-16 PUG: GRB primary header SCID mismatch with SANA registry and PUG PTRDOC-19877 DO.06.00.00 Vol 4, Table 7.2.1.6.2; Vol 5, Table 5.26.6-2 • WR 2691: SE-16 PUG: Abnormally large group areas in GLM L2+ products PTRDOC-19295 DO.06.00.00 Vol 5, Table 5.1.6.3-2 WR 4466: SE-16 PUG: No downscaling method given in multiband CMI files - ADR 262
F.2	09 May 2018	PTRDOC-19357 DO.06.03.00 Vol 1, Table 2.0; Vol 3, Table 5.3.1.5-2, Table 5.3.1.5.2-8; Vol 4, Table 7.4.1.5.1.2-1, Table 7.4.1.5.1.2-5, Table 7.4.1.5.2, Table 7.4.1.5.2 • WR 4208: SE-16 PUG: EXIS/EUVS Data Quality Flags Conditions PTRDOC-19843 DO.06.03.00 Vol 5, Tables 5.1.6.3-2 and 5.1.6.4-1 • WR 4883: SE-16 PUG: ABI L2 SCMI Expansion of Valid Range - PRO Rel Type 2 PTRDOC-19919 DO.06.03.00 Vol 3, Table 5.3.1.5-2 • WR 4399: SE-16 PUG: Update PUG for EUVS L1b files have no UNLIMITED dimension PTRDOC-20181 DO.06.03.00 Vol 3, Table 5.3.1.5-2, Table 5.3.1.5.2-14; Vol 4, Table 7.4.1.5.1, Table 7.4.1.5.1.2-1, Table 7.4.1.5.2 • WR 4080: SE-16 PUG: Add Primary C Active and Secondary C Active flags to EXIS/EUVS-C PTRDOC- 20304 DO.06.03.00 Vol 3, Table 5.5.1.5-2; Vol 4, Table 7.6.1.5.2 • WR 4759: SE-16 PUG: Change MAG variable name number_samples_per_report-ADR 395 - PRO Rel Type 1 PTRDOC- 20342 DO.06.03.00 Vol 3, Table 5.3.1.5.2-8, Table 5.3.1.5.2-10, Table 5.3.1.5.2-11, Table 5.3.2.5-2; Vol 4, Table 7.4.1.5.1.2-1, Table 7.4.1.5.1.2-5, Table 7.4.1.5.1.2-6

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		• WR 5141: SE-16 PUG: EXIS Flag issues-ADR 459-Pro Release Type 2 PTRDOC- 20466 DO.06.03.00 Vol 3, Table 5.3.1.5-2, Table 5.3.2.5-2; Vol 4, Table 7.4.1.5.1, Table 7.4.2.5.1, Table 7.4.2.5.2 • WR 4598: SE-16 PUG: Update PUG for EXIS _Unsigned attribute change-ADR 355 PTRDOC- 20467 DO.06.03.00 Vol 3, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.1 • WR 3568: SE-16 PUG: Revise EXIS EUVS-C Cadence - ADR 183 PTRDOC-20626 DO.06.03.00 Vol 3, Table 5.3.2.5-2; Vol 4, Table 7.4.2.5.1, Table 7.4.2.5.2 • WR 5096: SE-16 PUG: EXIS XRS Modify irradiance long names-ADR 446-PRO Release Type 1 PTRDOC-20667 DO.06.03.00 Vol 3, Table 5.4.4.5-2, Table D.4-3; Vol 4, Table 7.5.4.5.1, Table 7.5.4.5.2 • WR 4864: SE-16 PUG: SEISS - Add SGPS Temperatures to L1b product-ADR 405 PRO Rel Type 2 PTRDOC-20873 DO.06.03.00 Vol 3, Table 5.3.1.5-2, Table 5.3.1.5.2-2, Table 5.3.1.5.2-5, Table 5.3.1.5.2-7, Table 5.3.1.5.2-9, Table 5.3.1.5.2-11, Table 5.3.2.5.1-4; Vol 4, Table 7.4.1.5.2 • WR 4719: SE-16 PUG: EXIS L1b Data Quality Flag Additional Definition Info - ADR 366 PTRDOC- 20965 DO.06.03.00 Vol 3, Table D.3-4, Table D.3-5, Table D.3-6 • WR 5206: SE-16 PUG: Incorporate EXIS CalINR Tech Memo Rev B Changes - compliance with EXIS CDRL-79 Rev G PTRDOC-21089 DO.06.03.00 Vol 3, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.1, Table 7.4.1.5.2 • WR 5097: SE-16 PUG: EXIS EUVS fix units for line variables - ADR 447 PTRDOC- 21119 DO.06.03.00 Vol 3, Table 5.3.1.5-1, Table 5.3.1.5-2; Vol 4, Table 7.4.1.5.2 • WR 5334: SE-16 PUG: EXIS EUVS Add bandpasses for lines-ADR 448-PRO Release Type 1 PTRDOC- 21212 DO.06.03.00 Vol 3, Table 5.3.1.5-2, Table 5.3.2.5-2; Vol 4, Table 7.4.1.5.2, Table 7.4.2.5.2

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		• WR 5688: SE-16 PUG: Change EXIS au_factor range - ADR 543-PRO Release Type 1
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		  • WR 5425: SE-16 PUG: Incorrect variable attributes in SST netCDF files-ADR 495-PRO Release Type 1
		
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		  • WR 5393: SE-16 PUG: ADP Additional Data Quality Flags - ADR 394 - PRO Release Type 1
		
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G.2	08 March 2019	PTRDOC-22481 DO.07.02.00 Vol 3, Tables 5.1.3.6.1-2, 5.1.3.6.2-2, 5.1.3.6.4, D.1-7 Vol 4, Tables 7.1.3.6.1.2, 7.1.3.6.2.1, 7.1.3.6.2.2 Vol 5, Tables 5.1.6.1-2, 5.1.6.2-2, 5.1.6.3-2, 5.1.6.5 • WR 6582: SE-16 PUG: ABI L1b and L2+ CMI temperature data quality flag (TDQF) - ADR 827 PTRDOC-22268 DO.07.02.00 Vol 3, Table D.1-5 • WR 6348: SE-16 PUG: Updates for ABI CDRL-80 Rev G and CDRL-79 - ADR 741
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1.0 INTRODUCTION

1.1 Scope

The Product Definition and User's Guide (PUG) document provides product descriptions and formats for all data and products produced and made available to users by the Geostationary Operational Environmental Satellite R Series (GOES-R) Core Ground Segment (GS), developed under contract DG133E-09-CN-0094. This includes the Level 0 products, Level 1b products, GOES-R Rebroadcast (GRB), and Level 2+ products. This also includes ISO series metadata, instrument calibration data, and semi-static source data and algorithm packages.

This is an appendix to the PUG containing a detailed description of the ISO series metadata.

2.0 ISO SERIES METADATA OVERVIEW

GOES-R metadata is designed to serve two purposes:

- To support long-term archive and facilitate data discovery, evaluation, retrieval, use and reuse.

- To provide supplemental information for further processing, algorithm development, diagnostic and anomaly resolution and better understanding of each dataset.

For each Level 0, Level 1b, and Level 2+ product, ABI sample outlier data, instrument calibration data, and Level 1b and Level 2+ semi-static source data and algorithm packages, metadata is provided in an ISO-compliant XML product series (i.e., collection) level file. This metadata is in addition to the embedded native metadata existing in the GOES-R product and data files and is used to discover, display, exploit and further process the data. The ISO series metadata contains a set of "quasi-static" metadata elements that describe a collection of instances of a product or data. Their format, content, and citations to documents and points of contact are provided. Note that a complete ISO metadata record is produced by combining the series metadata with metadata in the product and data files using the ncISO functionality available at the NOAA Data Centers.

To present ISO Series Metadata in a readable format, each ISO xml file was transformed to text using a tool provided by NOAA National Geophysical Data Center (NGDC). The deeply nested xml format is flattened and includes only the specific fields containing metadata values. This presentation format provides links to the definitions of every ISO 19115 Universal Modeling Language (UML) class object and code list via a NOAA Enterprise Data Management (EDM) web site.

For example, given the following subset of ISO Series Metadata:

> **acquisitionInformation:** (MI_AcquisitionInformation)
>> **operation:** (MI_Operation)
>>> **description:** The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and provides ...

If the reader hovers their mouse over (MI_AcquisitionInformation), presses Ctrl+Click and is connected to the Internet, the NOAA EDM web page for that ISO UML class will display:

Further and complete details are available on the web site by clicking keywords (such as "Operation") on the page and subsequent pages:

The filename conventions for ISO series metadata are located in paragraph 6.0, ISO Series Metadata Filename Conventions.

3.0   LEVEL 0 PRODUCT ISO SERIES METADATA

3.1   ABI Level 0 Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: 405cba30-aba1-11e3-a5e2-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier:
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI L0 Product Collection
   contact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
         address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L0-ISO-SERIES_c20171311116000.xml

---

   identificationInfo: (MD_DataIdentification)
      citation: (CI_Citation)
         title: GOES-R Advanced Baseline Imager (ABI) Aggregated L0 Data Packets
         alternateTitle: Data short name (DSN): ABI-L0
         date:
         identifier: (MD_Identifier)
            authority: (CI_Citation)
               title: gov.nesdis.noaa
               date: (CI_Date)
                  date: 2014
                  dateType: (CI_DateTypeCode) revision
            code: ABI-L0
         citedResponsibleParty: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

    contactInfo: (CI_Contact)

      address: (CI_Address)

        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

        city: Silver Spring

        administrativeArea: MD

        postalCode: 20910

        country: USA

        electronicMailAddress: goes-r@noaa.gov

    role: (CI_RoleCode) originator

abstract: Advanced Baseline Imager (ABI) L0 data is comprised of unprocessed science data packets and telemetry packets. All science data and most telemetry data is sourced by the ABI instrument. L0 data includes select spacecraft telemetry in addition to instrument telemetry. ABI L0 data also includes orbit and attitude data and angular rate telemetry data (OAR), containing orbit ephemeris and satellite position.

pointOfContact: (CI_ResponsibleParty)

    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

    contactInfo: (CI_Contact)

      address: (CI_Address)

        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

        city: Silver Spring

        administrativeArea: MD

        postalCode: 20910

        country: USA

        electronicMailAddress: goes-r@noaa.gov

    role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

    name: netCDF

    version: 4

descriptiveKeywords: (MD_Keywords)

    keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS

    keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS

    type: (MD_KeywordTypeCode) theme

    thesaurusName: (CI_Citation)

      title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

      date: (CI_Date)

        date: 2012-10

        dateType: (CI_DateTypeCode)

      edition: Version 7.0.0.0.0

      citedResponsibleParty: (CI_ResponsibleParty)

        individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

    NON-Export Controlled Information

      role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
    useLimitation: Unrestricted
    classification: (MD_ClassificationCode) unclassified
  language: eng; USA
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
    temporalElement: (EX_TemporalExtent)
      extent:
       TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: abi_space_packet_data
      attributeType:
    descriptor: GOES-R Advanced Baseline Imager (ABI) L0 CCSDS Space Packets
    units:
    scaleFactor:
    offset:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: Advanced Baseline Imager (ABI) front-end processing starts on the

spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. ABI science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.

    processor: (CI_ResponsibleParty)
      organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
      role: (CI_RoleCode) processor
    processor: (CI_ResponsibleParty)
      organisationName: RBU (Remote Backup Unit, Fairmont, WV)
      role: (CI_RoleCode) processor
   output: (LE_Source)
    processedLevel: (MD_Identifier)
     authority: (CI_Citation)
      title: NOAA Processing Levels
      date: (CI_Date)
       date: 2013-11
       dateType: (CI_DateTypeCode) revision
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
       contactInfo: (CI_Contact)
        onlineResource: (CI_OnlineResource)
         linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
       role: (CI_RoleCode) publisher
     code: L0

---

  metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
   operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of

meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

> **identifier:** (MD_Identifier)
> > **authority:** (CI_Citation)
> > > **title:** http://science.nasa.gov/missions/goes-r/
> > > **date:**
> > **code:**
> **status:** (MD_ProgressCode) onGoing
> **parentOperation:**
> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-16

> **description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> > **instrument:** (MI_Instrument)
> > > **identifier:** (MD_Identifier)
> > > > **authority:** (CI_Citation)
> > > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > > **date:**
> > > > **code:** GOES-16 ABI instrument_id (serial number)
> > > **type:** Advanced Baseline Imager
> > > **description:** The Advanced Baseline Imager is the primary instrument on GOES-16

for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov
>>>> **date:**
>>> **code:** GOES-17

> **description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

>> **instrument:** (MI_Instrument)
>>> **identifier:** (MD_Identifier)
>>>> **authority:** (CI_Citation)
>>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html
>>>>> **date:**
>>>> **code:** GOES-17 ABI instrument_id (serial number)
>>> **type:** Advanced Baseline Imager
>>> **description:** The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to

weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

3.2　　　　GLM Level 0 Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f82fc080-a560-11e4-bcd8-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier:
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for GLM L0 Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_GLM-L0-ISO-SERIES_c20171311119000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R Geostationary Lightning Mapper (GLM) Aggregated L0 Data Packets

alternateTitle: Data short name (DSN): GLM-L0
date:
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
    code: GLM-L0
  citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
abstract: Geostationary Lightning Mapper (GLM) L0 data is comprised of unprocessed science data packets and telemetry packets. All science data and most telemetry data is sourced by the GLM instrument. L0 data includes select spacecraft telemetry in addition to instrument telemetry.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS
  keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)

   title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
   date: (CI_Date)
    date: 2012-10
    dateType: (CI_DateTypeCode) revision
   edition: Version 7.0.0.0.0
   citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  language: eng; USA
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now

---

 contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: glm_space_packet_data
     attributeType:
   descriptor: GOES-R Geostationary Lightning Mapper (GLM) L0 CCSDS Space Packets
   units:
   scaleFactor:
   offset:

---

 dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

             NON-Export Controlled Information

result: (DQ_QuantitativeResult)
  valueUnit:
   BaseUnit:
    identifier: percent
    unitsSystem:
  value:
lineage: (LI_Lineage)
  processStep: (LE_ProcessStep)
   description: Geostationary Lightning Mapper (GLM) front-end processing starts on the spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. GLM science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.
    processor: (CI_ResponsibleParty)
     organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
     role: (CI_RoleCode) processor
    processor: (CI_ResponsibleParty)
     organisationName: RBU (Remote Backup Unit, Fairmont, WV)
     role: (CI_RoleCode) processor
   output: (LE_Source)
    processedLevel: (MD_Identifier)
     authority: (CI_Citation)
      title: NOAA Processing Levels
      date: (CI_Date)
       date: 2013-11
       dateType: (CI_DateTypeCode) revision
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
       contactInfo: (CI_Contact)
        onlineResource: (CI_OnlineResource)
         linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
       role: (CI_RoleCode) publisher
     code: L0

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
        code: GOES-East (G16)
       description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and

the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/glm.html
> > > > **date:**
> > > **code:** GOES-16 GLM instrument_id (serial number)
> > **type:** Geostationary Lightning Mapper
> > **description:** The Geostationary Lightning Mapper is a single-channel, near-infrared

optical transient detector that detects the momentary changes in an optical scene, indicating the presence of lightning. GLM measures total lightning activity continuously over the Americas and adjacent ocean regions with near uniform spatial resolution of approximately 10 km. GLM provides early predictions of intensifying storms and severe weather events. It also provides data for long-term climate studies. The instrument aids forecasting of weather events that could affect aviation safety and efficiency. GLM is unique both in how it operates and in the information it collects. While ground-based sensors only provide cloud-to-ground lightning coverage, GLM provides total lightning activity detection with both cloud-to-ground and cloud-to-cloud coverage. Also, ground-based systems can only provide coverage over land. GLM identifies growing, active and potentially destructive thunderstorms in areas over both land and oceans. The instrument collects information such as the frequency and location of lightning events to detect the intensification of thunderstorms and tropical cyclones, which are often accompanied by increased lightning activity.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/glm.html

     date:
       code: GOES-17 GLM instrument_id (serial number)
       type: Geostationary Lightning Mapper
       description: The Geostationary Lightning Mapper is a single-channel, near-infrared optical transient detector that detects the momentary changes in an optical scene, indicating the presence of lightning. GLM measures total lightning activity continuously over the Americas and adjacent ocean regions with near uniform spatial resolution of approximately 10 km. GLM provides early predictions of intensifying storms and severe weather events. It also provides data for long-term climate studies. The instrument aids forecasting of weather events that could affect aviation safety and efficiency. GLM is unique both in how it operates and in the information it collects. While ground-based sensors only provide cloud-to-ground lightning coverage, GLM provides total lightning activity detection with both cloud-to-ground and cloud-to-cloud coverage. Also, ground-based systems can only provide coverage over land. GLM identifies growing, active and potentially destructive thunderstorms in areas over both land and oceans. The instrument collects information such as the frequency and location of lightning events to detect the intensification of thunderstorms and tropical cyclones, which are often accompanied by increased lightning activity.

3.3   SUVI Level 0 Product ISO Series Metadata

 (MI_Metadata)
  fileIdentifier: 1a47ee90-a561-11e4-bcd8-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier:
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for SUVI L0 Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
  dateStamp: 2017-05-11

metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_SUVI-L0-ISO-SERIES_c20171311122000.xml

---

identificationInfo: (MD_DataIdentification)
   citation: (CI_Citation)
      title: GOES-R Solar Ultraviolet Imager (SUVI) Aggregated L0 Data Packets
      alternateTitle: Data short name (DSN): SUVI-L0
      date:
      identifier: (MD_Identifier)
         authority: (CI_Citation)
            title: gov.nesdis.noaa
            date: (CI_Date)
               date: 2014
               dateType: (CI_DateTypeCode) revision
         code: SUVI-L0
      citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
            contactInfo: (CI_Contact)
               address: (CI_Address)
                  deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
                  city: Silver Spring
                  administrativeArea: MD
                  postalCode: 20910
                  country: USA
                  electronicMailAddress: goes-r@noaa.gov
            role: (CI_RoleCode) originator
   abstract: Solar Ultraviolet Imager (SUVI) L0 data is comprised of unprocessed science data packets and telemetry packets. All science data and most telemetry data is sourced by the SUVI instrument. L0 data includes select spacecraft telemetry in addition to instrument telemetry.
   pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
         contactInfo: (CI_Contact)
            address: (CI_Address)
               deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
               city: Silver Spring
               administrativeArea: MD
               postalCode: 20910
               country: USA
               electronicMailAddress: goes-r@noaa.gov
         role: (CI_RoleCode) originator
   resourceFormat: (MD_Format)
      name: netCDF

       version: 4
    descriptiveKeywords: (MD_Keywords)
      keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS
      keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS
      type: (MD_KeywordTypeCode) theme
      thesaurusName: (CI_Citation)
        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
        date: (CI_Date)
          date: 2012-10
          dateType: (CI_DateTypeCode) revision
        edition: Version 7.0.0.0.0
        citedResponsibleParty: (CI_ResponsibleParty)
          individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
          role: (CI_RoleCode) author
    resourceConstraints: (MD_SecurityConstraints)
      useLimitation: Unrestricted
      classification: (MD_ClassificationCode) unclassified
    language: eng; USA
    characterSet: (MD_CharacterSetCode) utf8
    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
    extent: (EX_Extent)
      temporalElement: (EX_TemporalExtent)
        extent:
         TimePeriod:
          beginPosition: 2017-05-11
          endPosition: now

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  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: suvi_space_packet_data
        attributeType:
      descriptor: GOES-R Solar Ultraviolet Imager (SUVI) L0 CCSDS Space Packets
      units:
      scaleFactor:
      offset:

NON-Export Controlled Information

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: Solar Ultraviolet Imager (SUVI) front-end processing starts on the spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. SUVI science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.
      processor: (CI_ResponsibleParty)
       organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
       role: (CI_RoleCode) processor
      processor: (CI_ResponsibleParty)
       organisationName: RBU (Remote Backup Unit, Fairmont, WV)
       role: (CI_RoleCode) processor
      output: (LE_Source)
       processedLevel: (MD_Identifier)
        authority: (CI_Citation)
         title: NOAA Processing Levels
         date: (CI_Date)
          date: 2013-11
          dateType: (CI_DateTypeCode) revision
         citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
          contactInfo: (CI_Contact)
           onlineResource: (CI_OnlineResource)
            linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
          role: (CI_RoleCode) publisher

code: L0

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metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
   operation: (MI_Operation)
     description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
        code: GOES-East (G16)
     description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and

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NON-Export Controlled Information

XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/suvi.html
         date:
      code: GOES-16 SUVI instrument_id (serial number)
   type: Solar Ultraviolet Imager
   description: The Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. SUVI observes and characterizes complex active regions of the Sun, solar flares, and the eruptions of solar filaments which may give rise to coronal mass ejections. Depending on the size and the trajectory of solar eruptions, the possible effects to near-Earth space and Earth's magnetosphere, referred to as space weather, can cause geomagnetic storms which disrupt power utilities, communication and navigation systems, and may cause radiation damage to orbiting satellites and the International Space Station. SUVI observations of solar flares and solar eruptions provide an early warning of possible impacts to Earth's space environment and enable better forecasting of potentially disruptive events on the ground.

platform: (MI_Platform)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
      code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

       instrument: (MI_Instrument)
        identifier: (MD_Identifier)
         authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/suvi.html
          date:
        code: GOES-17 SUVI instrument_id (serial number)
       type: Solar Ultraviolet Imager
       description: The Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. SUVI observes and characterizes complex active regions of the Sun, solar flares, and the eruptions of solar filaments which may give rise to coronal mass ejections. Depending on the size and the trajectory of solar eruptions, the possible effects to near-Earth space and Earth's magnetosphere, referred to as space weather, can cause geomagnetic storms which disrupt power utilities, communication and navigation systems, and may cause radiation damage to orbiting satellites and the International Space Station. SUVI observations of solar flares and solar eruptions provide an early warning of possible impacts to Earth's space environment and enable better forecasting of potentially disruptive events on the ground.

3.4 EXIS Level 0 Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 542948c0-a561-11e4-bcd8-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier:
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for EXIS L0 Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
     address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions

for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_EXIS-L0-ISO-SERIES_c20171311118000.xml

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  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R Extreme Ultraviolet and X-Ray Irradiance Sensors (EXIS) Aggregated L0 Data Packets
      alternateTitle: Data short name (DSN): EXIS-L0
      date:
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: EXIS-L0
      citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
          contactInfo: (CI_Contact)
            address: (CI_Address)
              deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
              city: Silver Spring
              administrativeArea: MD
              postalCode: 20910
              country: USA
              electronicMailAddress: goes-r@noaa.gov
          role: (CI_RoleCode) originator
    abstract: The Extreme Ultraviolet and X-ray Irradiance Sensors detect solar soft X-ray irradiance and solar extreme ultraviolet spectral irradiance in the 5-127 nm range. The X-Ray Sensor (XRS) monitors solar flares that can disrupt communications and degrade navigational accuracy, affecting satellites, astronauts, high latitude airline passengers, and power grid performance. The Extreme Ultraviolet (EUV) Sensor monitors solar variations that directly affect satellite drag/tracking and ionospheric changes, which impact communications and navigation operations. This information is critical to understanding the outer layers of the Earth's atmosphere. L0 data includes select spacecraft telemetry in addition to instrument telemetry.
    pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910

        country: USA
        electronicMailAddress: goes-r@noaa.gov
     role: (CI_RoleCode) originator
   resourceFormat: (MD_Format)
    name: netCDF
    version: 4
   descriptiveKeywords: (MD_Keywords)
    keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR
COUNTS
    keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR
COUNTS
    type: (MD_KeywordTypeCode) theme
    thesaurusName: (CI_Citation)
     title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
     date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
     edition: Version 7.0.0.0.0
     citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
       role: (CI_RoleCode) author
   resourceConstraints: (MD_SecurityConstraints)
    useLimitation: Unrestricted
    classification: (MD_ClassificationCode) unclassified
   language: eng; USA
   characterSet: (MD_CharacterSetCode) utf8
   topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
   extent: (EX_Extent)
    temporalElement: (EX_TemporalExtent)
     extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

 contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: exis_space_packet_data
     attributeType:
   descriptor: GOES-R EUV and X-Ray Irradiance Sensors (EXIS) L0 CCSDS Space

    NON-Export Controlled Information

Packets
    units:
    scaleFactor:
    offset:

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dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: Extreme Ultraviolet and X-Ray Irradiance Sensors (EXIS) front-end processing starts on the spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. EXIS science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.
      processor: (CI_ResponsibleParty)
        organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
        role: (CI_RoleCode)
      processor: (CI_ResponsibleParty)
        organisationName: RBU (Remote Backup Unit, Fairmont, WV)
        role: (CI_RoleCode) processor
    output: (LE_Source)
      processedLevel: (MD_Identifier)
        authority: (CI_Citation)
          title: NOAA Processing Levels
          date: (CI_Date)
           date: 2013-11
           dateType: (CI_DateTypeCode) revision
         citedResponsibleParty: (CI_ResponsibleParty)
          organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

         contactInfo: (CI_Contact)
           onlineResource: (CI_OnlineResource)
            linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

           role: (CI_RoleCode) publisher
      code: L0

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metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode)
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
           title: http://www.goes-r.gov
           date:
          code: GOES-East (G16)

       NON-Export Controlled Information

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/exis.html
          date:
        code: GOES-16 EXIS instrument_id (serial number)
      type: EUV and X-Ray Irradiance Sensors (EXIS)
      description: The Extreme Ultraviolet and X-ray Irradiance Sensors detect solar soft X-ray irradiance and solar extreme ultraviolet spectral irradiance in the 5-127 nm range. The X-Ray Sensor (XRS) monitors solar flares that can disrupt communications and degrade navigational accuracy, affecting satellites, astronauts, high latitude airline passengers, and power grid performance. The Extreme Ultraviolet Sensor monitors solar variations that directly affect satellite drag/tracking and ionospheric changes, which impact communications and navigation operations. This information is critical to understanding the outer layers of the Earth's atmosphere. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information

Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/exis.html
            date:
          code: GOES-17 EXIS instrument_id (serial number)
        type: EUV and X-Ray Irradiance Sensors (EXIS)
        description: The Extreme Ultraviolet and X-ray Irradiance Sensors detect solar soft X-ray irradiance and solar extreme ultraviolet spectral irradiance in the 5-127 nm range. The X-Ray Sensor (XRS) monitors solar flares that can disrupt communications and degrade navigational accuracy, affecting satellites, astronauts, high latitude airline passengers, and power grid performance. The Extreme Ultraviolet Sensor monitors solar variations that directly affect satellite drag/tracking and ionospheric changes, which impact communications and navigation operations. This information is critical to understanding the outer layers of the Earth's atmosphere. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array.

3.5   SEISS Level 0 Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 85e0f200-a561-11e4-bcd8-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier:
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for SEISS L0 Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910

      NON-Export Controlled Information

country: USA
electronicMailAddress: GOES-R@noaa.gov
   role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SEIS-L0-ISO-SERIES_c20171311121000.xml

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identificationInfo: (MD_DataIdentification)
   citation: (CI_Citation)
      title: GOES-R Space Environment In-Situ Suite (SEISS) Aggregated L0 Data Packets
      alternateTitle: Data short name (DSN): SEIS-L0
      date:
      identifier: (MD_Identifier)
         authority: (CI_Citation)
            title: gov.nesdis.noaa
            date: (CI_Date)
               date: 2014
               dateType: (CI_DateTypeCode) revision
         code: SEIS-L0
      citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
            contactInfo: (CI_Contact)
               address: (CI_Address)
                  deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
                  city: Silver Spring
                  administrativeArea: MD
                  postalCode: 20910
                  country: USA
                  electronicMailAddress: goes-r@noaa.gov
            role: (CI_RoleCode) originator
   abstract: Space Environment In-Situ Suite (SEISS) L0 data is comprised of unprocessed
science data packets and telemetry packets. All science data and most telemetry data is sourced
by the SEISS instrument. L0 data includes select spacecraft telemetry in addition to instrument
telemetry.
   pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
         contactInfo: (CI_Contact)
            address: (CI_Address)
               deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
               city: Silver Spring
               administrativeArea: MD
               postalCode: 20910

     country: USA
     electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
   resourceFormat: (MD_Format)
    name: netCDF
    version: 4
   descriptiveKeywords: (MD_Keywords)
    keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR
COUNTS
    keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR
COUNTS
    type: (MD_KeywordTypeCode) theme
    thesaurusName: (CI_Citation)
     title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
     date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
     edition: Version 7.0.0.0.0
     citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
   resourceConstraints: (MD_SecurityConstraints)
    useLimitation: Unrestricted
    classification: (MD_ClassificationCode) unclassified
   language: eng; USA
   characterSet: (MD_CharacterSetCode) utf8
   topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
   extent: (EX_Extent)
    temporalElement: (EX_TemporalExtent)
     extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: seiss_space_packet_data
     attributeType:
    descriptor: GOES-R Space Environment In-Situ Suite (SEISS) L0 CCSDS Space

Packets
    units:
    scaleFactor:
    offset:

---

  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
      level: (MD_ScopeCode) dataset
    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_L0_errors
      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
        valueUnit:
         BaseUnit:
          identifier: percent
          unitsSystem:
        value:
    lineage: (LI_Lineage)
      processStep: (LE_ProcessStep)
        description: Space Environment In-Situ Suite (SEISS) front-end processing starts on the spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. SEISS science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.
        processor: (CI_ResponsibleParty)
          organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
          role: (CI_RoleCode) processor
        processor: (CI_ResponsibleParty)
          organisationName: RBU (Remote Backup Unit, Fairmont, WV)
          role: (CI_RoleCode) processor
        output: (LE_Source)
         processedLevel: (MD_Identifier)
          authority: (CI_Citation)
            title: NOAA Processing Levels
            date: (CI_Date)
             date: 2013-11
             dateType: (CI_DateTypeCode) revision
            citedResponsibleParty: (CI_ResponsibleParty)
             organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

    NON-Export Controlled Information

        contactInfo: (CI_Contact)
         onlineResource: (CI_OnlineResource)
          linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels

         role: (CI_RoleCode) publisher
     code: L0

---

 metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information
about a collection of datasets of a product line that changes infrequently

---

 acquisitionInformation: (MI_AcquisitionInformation)
   operation: (MI_Operation)
     description: The Geostationary Operational Environmental Satellite-R Series (GOES-R)
is the United States Government geostationary weather satellite series having an operational life-
cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the
GOES-R series result in more timely and accurate forecasts and warnings than previous
generations, including the capability to image its near hemispherical field of view in five minutes.
The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and
lightning detection capability improves support for the detection and observations of
meteorological phenomena that directly affect public safety, protection of property, and
ultimately, economic health and development. The GOES-R series was a collaborative
development and acquisition effort between the National Oceanic and Atmospheric
Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The
GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's
Western Hemisphere and space weather monitoring. It is the primary tool for the detection and
tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of
Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis
stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit
storage. The satellite operates through periodic station-keeping and momentum transfer
maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
        code: GOES-East (G16)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/seiss.html
         date:
      code: GOES-16 SEISS instrument_id (serial number)
   type: Space Environment In-Situ Suite
   description: The Space Environment In-Situ Suite is comprised of four sensors that will monitor proton, electron, and heavy ion fluxes at geosynchronous orbit. The information provided by SEISS is critical for assessing the electrostatic discharge (ESD) risk and radiation hazard to astronauts and satellites. In addition to hazard assessment, the information from SEISS can be used to warn of high flux events, mitigating any damage to radio communication. The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). Data from SEISS will drive solar radiation storm portion of NOAA space weather scales and other alerts and warnings and will improve energetic particle forecasts.

platform: (MI_Platform)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
      code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission

(HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

     instrument: (MI_Instrument)
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: http://www.goes-r.gov/spacesegment/glm.html
           date:
         code: GOES-17 SEISS instrument_id (serial number)
       type: Space Environment In-Situ Suite
       description: The Space Environment In-Situ Suite is comprised of four sensors that will monitor proton, electron, and heavy ion fluxes at geosynchronous orbit. The information provided by SEISS is critical for assessing the electrostatic discharge (ESD) risk and radiation hazard to astronauts and satellites. In addition to hazard assessment, the information from SEISS can be used to warn of high flux events, mitigating any damage to radio communication. The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). Data from SEISS will drive solar radiation storm portion of NOAA space weather scales and other alerts and warnings and will improve energetic particle forecasts.

3.6   Magnetometer Level 0 Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 389e80c0-a561-11e4-bcd8-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier:
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for MAG L0 Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring

       administrativeArea: MD
       postalCode: 20910
       country: USA
       electronicMailAddress: GOES-R@noaa.gov
   role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_MAG-L0-ISO-SERIES_c20171311120000.xml

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identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R Magnetometer (MAG) Aggregated L0 Data Packets
    alternateTitle: Data short name (DSN): MAG-L0
    date:
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: MAG-L0
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
         address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: Magnetometer (MAG) L0 data is comprised of unprocessed science data packets and telemetry packets. All science data and most telemetry data is sourced by the MAG instrument. L0 data includes select spacecraft telemetry in addition to instrument telemetry.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD

    postalCode: 20910
    country: USA
    electronicMailAddress: goes-r@noaa.gov
   role: (CI_RoleCode) originator
  resourceFormat: (MD_Format)
   name: netCDF
   version: 4
  descriptiveKeywords: (MD_Keywords)
   keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS
   keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS
   type: (MD_KeywordTypeCode) theme
   thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
     date: 2012-10
     dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
     individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
     role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  language: eng; USA
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now

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 contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mag_space_packet_data
    attributeType:

descriptor: GOES-R Magnetometer (MAG) L0 CCSDS Space Packets
units:
scaleFactor:
offset:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: Magnetometer (MAG) front-end processing starts on the spacecraft where space packets are multiplexed placing multiple packets in each transfer frame. Forward error correction (FEC) coding (Low-Density Parity Check - LDPC) occurs and the packets are downlinked. The data is received, forward error correction decode is performed. In the event of an uncorrectable error the transfer frame is discarded. Error-free space packets are then extracted from the transfer frames. MAG science data arrives at the ground system from the spacecraft in a compressed format. The data is decompressed then packaged for delivery to external interfaces.
      processor: (CI_ResponsibleParty)
        organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
        role: (CI_RoleCode) processor
      processor: (CI_ResponsibleParty)
        organisationName: RBU (Remote Backup Unit, Fairmont, WV)
        role: (CI_RoleCode) processor
      output: (LE_Source)
        processedLevel: (MD_Identifier)
         authority: (CI_Citation)
          title: NOAA Processing Levels
          date: (CI_Date)
           date: 2013-11
           dateType: (CI_DateTypeCode) revision
         citedResponsibleParty: (CI_ResponsibleParty)
          organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
          contactInfo: (CI_Contact)

           onlineResource: (CI_OnlineResource)
             linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
         role: (CI_RoleCode) publisher
      code: L0

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
        identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: http://science.nasa.gov/missions/goes-r/
           date:
         code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: http://www.goes-r.gov
           date:
         code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/mag.html
> > > > **date:**
> > > **code:** GOES-16 MAG instrument_id (serial number)
> > **type:** Magnetometer
> > **description:** The GOES-R Magnetometer provides measurements of the space

environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products are an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning

detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov/spacesegment/mag.html
>>>> **date:**
>>> **code:** GOES-17 MAG instrument_id (serial number)
>> **type:** Magnetometer
>> **description:** The GOES-R Magnetometer provides measurements of the space

environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products are an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

4.0   LEVEL 1B PRODUCT AND DATA ISO SERIES METADATA

4.1   Level 1b Products

4.1.1   Radiances Product ISO Series Metadata

> (MI_Metadata)
>> **fileIdentifier:** a70be540-c38b-11e0-962b-0800200c9a66
>> **language:** eng
>> **characterSet:** (MD_CharacterSetCode) utf8
>> **parentIdentifier:** n/a
>> **hierarchyLevel:** (MD_ScopeCode) series
>> **hierarchyLevelName:** ISO Series Metadata for ABI Level 1b Radiances Product Collection
>> **contact:** (CI_ResponsibleParty)

     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
       contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: GOES-R@noaa.gov
       role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L1b-ISO-SERIES_c20171311123000.xml

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   spatialRepresentationInfo: (MD_Georectified)
     numberOfDimensions: 2
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) row
       dimensionSize: 10848
       resolution:
        Distance: 1
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) column
       dimensionSize: 10848
       resolution:
        Distance: 1
     cellGeometry: (MD_CellGeometryCode) area
     transformationParameterAvailability: true
     checkPointAvailability: false
     pointInPixel: (MD_PixelOrientationCode) upperLeft
     transformationDimensionDescription: Full Disk; ABI Channels 1, 3, 5

---

   spatialRepresentationInfo: (MD_Georectified)
     numberOfDimensions: 2
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) row
       dimensionSize: 3000
       resolution:
        Distance: 1
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) column
       dimensionSize: 5000
       resolution:

Distance: 1
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: CONUS; ABI Channels 1, 3, 5

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1000
    resolution:
    Distance: 1
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 1000
    resolution:
    Distance: 1
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale; ABI Channels 1, 3, 5

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 21696
    resolution:
    Distance: 0.5
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 21696
    resolution:
    Distance: 0.5
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk; ABI Channel 2

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2

NON-Export Controlled Information

    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 6000
      resolution:
        Distance: 0.5
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 10000
      resolution:
        Distance: 0.5
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: CONUS; ABI Channel 2

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 2000
      resolution:
        Distance: 0.5
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 2000
      resolution:
        Distance: 0.5
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Mesoscale; ABI Channel 2

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
        Distance: 2

      NON-Export Controlled Information

cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Full Disk; ABI Channels 4 and 6 - 16

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS; ABI Channels 4 and 6 - 16

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale; ABI Channels 4 and 6 - 16

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)

title: Product Definition and Users Guide (PUG) Volume 3: Level 1b Products
date: (CI_Date)
  date: 2014
  dateType: (CI_DateTypeCode) publication
otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
code: goes_projection
codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R ABI Level 1b Radiances Product
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C01
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C02
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C03
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C04
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C05
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C06
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C07
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C08
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C09
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C10
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C11
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C12
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C13
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C14
    alternateTitle: Data short name (DSN): ABI-L1b-RadM1-M3C15
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    alternateTitle: Data short name (DSN): ABI-L1b-RadM2-M3C01
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    alternateTitle: Data short name (DSN): ABI-L1b-RadM2-M3C06
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alternateTitle: Data short name (DSN): ABI-L1b-RadF-M4C16
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L1b-Rad*
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator

abstract: The ABI instrument samples the radiance of the Earth in sixteen spectral bands using several arrays of detectors in the instrument's focal plane. Single reflective band ABI L1b Radiance Products (channels 1 - 6 with wavelengths 0.47, 0.64, 0.87, 1.38, 1.61, 2.25 microns, respectively) are digital maps of outgoing radiance values at the top of the atmosphere for visible and near-IR bands. Single emissive band ABI L1b Radiance Products (channels 7 - 16 with wavelengths 3.89, 6.17, 6.93, 7.34, 8.44, 9.61, 10.33, 11.19, 12.27, 13.27 microns, respectively) are digital maps of outgoing radiance values at the top of the atmosphere for IR bands. Detector

samples are compressed, packetized and down-linked to the ground station as Level 0 data for conversion to calibrated, geo-located pixels (Level 1b Radiance data). The detector samples are decompressed, radiometrically corrected, navigated and resampled onto an invariant output grid, referred to as the ABI fixed grid.

pointOfContact: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: GOES-R@noaa.gov

role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

name: netCDF

version: 4

descriptiveKeywords: (MD_Keywords)

keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > VISIBLE RADIANCE

keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > INFRARED RADIANCE

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

date: (CI_Date)

date: 2012-10

dateType: (CI_DateTypeCode) revision

edition: Version 7.0.0.0.0

citedResponsibleParty: (CI_ResponsibleParty)

individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

role: (CI_RoleCode) author

descriptiveKeywords: (MD_Keywords)

keyword: toa_outgoing_radiance_per_unit_wavelength

keyword: toa_outgoing_radiance_per_unit_wavenumber

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: CF Standard Name Table v25

date: (CI_Date)

date: 2013-07-05

dateType: (CI_DateTypeCode) revision

resourceConstraints: (MD_SecurityConstraints)

useLimitation: Unrestricted

classification: (MD_ClassificationCode) unclassified

spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: .5
spatialResolution: (MD_Resolution)
  distance:
   Distance: 1
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)

  geographicIdentifier: (MD_Identifier)
   code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 175.623576
   eastBoundLongitude: -89.623576
   southBoundLatitude: 14.571340
   northBoundLatitude: 53.500062
 extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Mesoscale

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contentInfo: (MI_CoverageDescription)
 attributeDescription:
  RecordType: variable
 contentType: (MD_CoverageContentTypeCode) physicalMeasurement
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: Rad
    attributeType:
  descriptor: ABI L1b Radiances per pixel (channels 1 - 6)
  units:
   DerivedUnit:
    identifier: mW m-2 sr-1 um-1
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:

---

contentInfo: (MI_CoverageDescription)
 attributeDescription:
  RecordType: variable
 contentType: (MD_CoverageContentTypeCode) physicalMeasurement
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: Rad
    attributeType:
  descriptor: ABI L1b Radiances per pixel (channels 7 - 16)
  units:
   DerivedUnit:
    identifier: mW m-2 sr-1 (cm-1)-1
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:

derivationUnitTerm:

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contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 1b Radiances data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Statistics are provided for minimum, maximum, mean and standard deviation radiance value of valid pixels; counts of: missing pixels samples, pixels that exceed saturation limit, pixels below undersaturation limit, and pixels with each data quality flag value in the product image; and percent of uncorrectable L0 errors.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  lineage: (LI_Lineage)
   processStep: (LE_ProcessStep)
    description: Raw data downlink is received by the Antenna system which processes the data through signal processing equipment to Intermediate Frequency. Forward error correction is performed. If FEC fails, those packets are dropped. Good packets are input to L0 processing. In L0 processing packets are uncompressed, extracted and byte-aligned (L1a). L1b processing extracts the L1a data, performs radiometric and geometric correction on the data to create L1b data.
    processor: (CI_ResponsibleParty)
     organisationName: NESDIS/OSPO at WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)

      role: (CI_RoleCode) processor
    processor: (CI_ResponsibleParty)
      organisationName: NESDIS/OSPO at RBU (Remote Backup Unit, Fairmont, WV)
      role: (CI_RoleCode) processor
    output: (LE_Source)
      description: Advanced Baseline Imager (ABI) L1b data is a pixel array of resampled, radiometrically corrected, Earth located imagery with associated per-pixel quality flag array. End-products are unique to an ABI scene (Full Disk, CONUS or Mesoscale) and ABI channel (1 - 16).
      processedLevel: (MD_Identifier)
       authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
         date: 2013-11
         dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
         role: (CI_RoleCode) publisher
      code: L1b

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of

Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://science.nasa.gov/missions/goes-r/
            date:
          code:
        status: (MD_ProgressCode) onGoing
        parentOperation:
        platform: (MI_Platform)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov
              date:
            code: GOES-East (G16)
          description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

           instrument: (MI_Instrument)
            identifier: (MD_Identifier)
              authority: (CI_Citation)
                title: http://www.goes-r.gov/spacesegment/abi.html
                date:
              code: GOES-16 ABI instrument_id (serial number)
            type: Advanced Baseline Imager
            description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3

concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
 identifier: (MD_Identifier)
  authority: (CI_Citation)
   title: http://www.goes-r.gov
   date:
  code: GOES-West (G17)
 description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

 instrument: (MI_Instrument)
  identifier: (MD_Identifier)
   authority: (CI_Citation)
    title: http://www.goes-r.gov/spacesegment/abi.html
    date:
   code: GOES-17 ABI instrument_id (serial number)
  type: Advanced Baseline Imager
  description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

4.1.2 Level 1b SUVI Solar Imagery: Extreme Ultraviolet Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f5816f57-fd6d-11e3-a3ac-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for Level 1b SUVI Solar Imagery: Extreme Ultraviolet Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_SUVI-L1b-SUVI-ISO-SERIES_c20171311126000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R Level 1b SUVI Solar Imagery: Extreme Ultraviolet Product ISO Series Metadata
      alternateTitle: Data short name (DSN): SUVI-L1b-Fe093
      alternateTitle: Data short name (DSN): SUVI-L1b-Fe131
      alternateTitle: Data short name (DSN): SUVI-L1b-Fe171
      alternateTitle: Data short name (DSN): SUVI-L1b-Fe195
      alternateTitle: Data short name (DSN): SUVI-L1b-Fe284
      alternateTitle: Data short name (DSN): SUVI-L1b-He303
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision

code: SUVI-L1b-*

citedResponsibleParty: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

abstract: The Solar Ultraviolet Imager (SUVI) Level 1b Solar Imagery: X-Ray product contains an image of the Sun at one of six wavelengths with different exposure times, and metadata required for exploitation and higher level processing. This product also contains an array containing a quality flag for each pixel in the solar image.

pointOfContact: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

name: netCDF

version: 4

resourceFormat: (MD_Format)

name: FITS

version: 3.0

descriptiveKeywords: (MD_Keywords)

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR IMAGERY

keyword: ATMOSPHERE > ATMOSPHERIC RADIATION > SOLAR RADIATION

keyword: SPECTRAL/ENGINEERING > ULTRAVIOLET WAVELENGTHS > ULTRAVIOLET RADIANCE

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > CORONA

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > CORONA HOLES

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > CORONAL MASS EJECTIONS

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR ACTIVE REGIONS

keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR FLARES
keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR PROMINENCES/SOLAR FILAMENTS
keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR ULTRAVIOLET EMISSIONS
keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SUN SPOTS
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
  title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
  date: (CI_Date)
    date: 2012-10
    dateType: (CI_DateTypeCode) revision
  edition: Version 7.0.0.0.0
  citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
language: eng
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) geoscientificInformation
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
    RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
      MemberName:
        aName: RAD
        attributeType:
    descriptor: Level 1b SUVI Solar Imagery: Extreme Ultraviolet data
    units:
      DerivedUnit:
        identifier: W m-2 sr-1
        derivationUnitTerm:
        derivationUnitTerm:

       derivationUnitTerm:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) thematicClassification
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: DQF
        attributeType:
      descriptor: Level 1b SUVI Solar Imagery: Extreme Ultraviolet data quality flags
      units:

---

  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
     level: (MD_ScopeCode) dataset
    report: (DQ_CompletenessOmission)
     nameOfMeasure: percent_uncorrectable_L0_errors
     evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
       valueUnit:
        BaseUnit:
         identifier: percent
         unitsSystem:
       value:
    lineage: (LI_Lineage)
     processStep: (LE_ProcessStep)
      description: SUVI is a solar imager capable of operation in the soft EUV to EUV wavelength range. It provides full-disk solar images at high cadence around the clock, except for brief periods during satellite eclipse. The operational goals of the SUVI are to image the solar emissions and temperatures within the EUV spectrum, to locate coronal holes for the forecasting of recurring geomagnetic activity, to locate solar flares for the forecasting of energetic particle events, to assess active region complexity for solar flare forecasting, and to determine the signatures of Coronal Mass Ejections (CME). The ground processing algorithm applies several correction and calibration processes in order to generate the photon fluxes for the final L1b product.
      processor: (CI_ResponsibleParty)
       organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
       role: (CI_RoleCode) processor
      processor: (CI_ResponsibleParty)
       organisationName: RBU (Remote Backup Unit, Fairmont, WV)

---

    role: (CI_RoleCode) processor
   output: (LE_Source)
    description: The Solar Ultraviolet Imager (SUVI) Level 1b Solar Imagery: X-Ray product contains an image of the Sun at one of six wavelengths with different exposure times, and metadata required for exploitation and higher level processing. This product also contains an array containing a quality flag for each pixel in the solar image.
    processedLevel: (MD_Identifier)
    authority: (CI_Citation)
     title: NOAA Processing Levels
     date: (CI_Date)
      date: 2013-11
      dateType: (CI_DateTypeCode) revision
     citedResponsibleParty: (CI_ResponsibleParty)
     organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
      contactInfo: (CI_Contact)
       onlineResource: (CI_OnlineResource)
        linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
      role: (CI_RoleCode) publisher
    code: L1b

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
   description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit

storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
      code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-East (G16)
    description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/suvi.html
          date:
        code: GOES-16 SUVI instrument_id (serial number)
      type: Solar Ultraviolet Imager - SUVI
      description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. The SUVI observes full disk solar images around the clock.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
    description: The GOES-R System acquires and disseminates environmental data from

        NON-Export Controlled Information

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/suvi.html
              date:
            code: GOES-17 SUVI instrument_id (serial number)
          type: Solar Ultraviolet Imager - SUVI
          description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. The SUVI observes full disk solar images around the clock.

4.1.3   Solar Flux: Extreme Ultraviolet Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f7087580-e5a8-11e3-ac10-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for EXIS Level 1b Solar Flux: Extreme
Ultraviolet Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_EXIS-L1b-SFEU-ISO-SERIES_c20171311123000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: EXIS Level 1b Solar Flux: Extreme Ultraviolet Product ISO Series Metadata
      alternateTitle: Data short name (DSN): EXIS-L1b-SFEU
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: EXIS-L1b-SFEU
      citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
          contactInfo: (CI_Contact)
            address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
abstract: The Extreme Ultraviolet (EUV) solar flux product consists of a solar irradiance spectrum covering the wavelength range from 5 nm to 127 nm. The Extreme Ultraviolet Sensor and X-ray Irradiance Sensors (EXIS) instrument does not directly measure the entire spectrum over this wavelength range. Instead, the ground processing algorithm computes the solar spectrum using a proxy model based on the set of measurements obtained from the XRS-A channel (0.05-0.4 nm), the XRS-B channel (0.1-0.8 nm) and the three channels from the EUV sensor. The ground processing algorithm will produce this spectrum with a spectral resolution of 5 nm over the entire wavelength range with one 10 nm exception being the 117 - 127 nm wavelength bin.
pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)
keyword: SPECTRAL/ENGINEERING > ULTRAVIOLET WAVELENGTHS > ULTRAVIOLET FLUX
keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR IRRADIANCE
keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR ULTRAVIOLET EMISSIONS
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0
citedResponsibleParty: (CI_ResponsibleParty)
individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,

M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
    resourceConstraints: (MD_SecurityConstraints)
      useLimitation: Unrestricted
      classification: (MD_ClassificationCode) unclassified
    language: eng
    characterSet: (MD_CharacterSetCode) utf8
    topicCategory: (MD_TopicCategoryCode) geoscientificInformation
    extent: (EX_Extent)
      temporalElement: (EX_TemporalExtent)
        extent:
         TimePeriod:
          beginPosition: 2017-05-11
          endPosition: now

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: irradianceSpectrum
        attributeType:
      descriptor: irradiance spectrum for wavelengths between 5 and 127 nm calculated using a proxy model based on inputs from XRS A and B channels, and EUVS A, B. and C channels
      units:
       DerivedUnit:
        identifier: W m-2 nm-1
        derivationUnitTerm:
        derivationUnitTerm:
        derivationUnitTerm:

---

  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
      level: (MD_ScopeCode) dataset
    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_L0_errors
      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
        valueUnit:
         BaseUnit:

identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The ground processing algorithm (GPA) converts the raw data from all of the photodiodes for both XRS channels from digital numbers into electrical current using the integration time and the total diode gain factor, composed of the pre-flight temperature calibration value, the in-flight temporal calibration factor, and the gain linearity factor. The GPA calculates and removes the dark diode current, caused by the radiation background, the thermal contribution from the diode material and the temperature-dependent electrical offset from the measured current. The GPA sums the four currents for the solar maximum quadrant diode set. The GPA converts the solar minimum and the solar maximum currents to irradiance values using the instrument responsivity and the field-of-view correction generated from the EXIS Solar Position Sensor (SPS) pointing data and determines the primary irradiance for each channel based on a calibration threshold value. The GPA computes the 1-AU correction factor to the X-Ray fluxes to support the generation of higher-level products at a later time. The GPA also has a requirement to calculate the XRS ratio, XRS-A and XRS-B primary irradiances for use in the EUV solar flux end product processing.
processor: (CI_ResponsibleParty)
organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
role: (CI_RoleCode) processor
processor: (CI_ResponsibleParty)
organisationName: RBU (Remote Backup Unit, Fairmont, WV)
role: (CI_RoleCode) processor
output: (LE_Source)
description: The Extreme Ultraviolet (EUV) solar flux product consists of a solar irradiance spectrum covering the wavelength range from 5 nm to 127 nm. The Extreme Ultraviolet Sensor and X-ray Irradiance Sensors (EXIS) instrument does not directly measure the entire spectrum over this wavelength range. Instead, the ground processing algorithm computes the solar spectrum using a proxy model based on the set of measurements obtained from the XRS-A channel (0.05-0.4 nm), the XRS-B channel (0.1-0.8 nm) and the three channels from the EUV sensor. The ground processing algorithm will produce this spectrum with a spectral resolution of 5 nm over the entire wavelength range.
processedLevel: (MD_Identifier)
authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc

essing_Levels

role: (CI_RoleCode) publisher
code: L1b

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metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
operation: (MI_Operation)
description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://science.nasa.gov/missions/goes-r/
date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov
date:
code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support,

process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/exis.html
> > > > **date:**
> > > **code:** GOES-16 EXIS serial number
> > **type:** Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)
> > **description:** The EXIS contains two primary sensors, the Extreme Ultraviolet

Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The instrument also includes the Sun Positioning Sensor (SPS).

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)

NON-Export Controlled Information

title: http://www.goes-r.gov/spacesegment/exis.html
date:
code: GOES-17 EXIS serial number
type: Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)
description: The EXIS contains two primary sensors, the Extreme Ultraviolet Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The instrument also includes the Sun Positioning Sensor (SPS).

4.1.4   Solar Flux: X-Ray Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f7087581-e5a8-11e3-ac10-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for EXIS Level 1b Solar Flux: X-Ray Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_EXIS-L1b-SFXR-ISO-SERIES_c20171311124000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: EXIS Level 1b Solar Flux: X-Ray Product ISO Series Metadata
      alternateTitle: Data short name (DSN): EXIS-L1b-SFXR
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)

authority: (CI_Citation)
  title: gov.nesdis.noaa
  date: (CI_Date)
    date: 2014
    dateType: (CI_DateTypeCode) revision
  code: EXIS-L1b-SFXR
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The solar flux X-Ray product consists of two irradiance measurements within the X-Ray spectrum of the Sun. The algorithm generates this product using XRS measurements of the solar flux in two channels: XRS-A covering 0.05-0.4 nm and XRS-B covering 0.1-0.8 nm. In order to span the full dynamic range of the X-Ray radiation over the approximate 11-year solar cycle, each channel of the XRS uses both a solar minimum photodiode and a solar maximum quadrant photodiode set. The solar minimum diode performs well during periods of low solar activity, but can saturate during high solar activity. The set of quadrant photodiodes provides good coverage of the X-Ray solar flux during high activity and flares, but may bottom-out during low activity. In addition, the individual signals in the quadrant provide a means for estimating the location of flares on the solar disk. The product data will contain a flag to indicate whether the solar minimum or solar maximum photodiodes correspond to the primary irradiance measurement for each channel. The X-Ray solar flux product also includes a set of quality flags to assess the state and health of the instrument, product metadata indicating the measurement details and quality of the product data, and intermediate data required for the generation of higher-level products.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF

version: 4
descriptiveKeywords: (MD_Keywords)
   keyword: SPECTRAL/ENGINEERING > X-RAY > X-RAY FLUX
   keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR
IRRADIANCE
   keyword: SUN-EARTH INTERACTIONS > SOLAR ACTIVITY > SOLAR X-RAY
EMISSIONS
   keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX
> X-RAY FLUX
   type: (MD_KeywordTypeCode) theme
   thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
     date: 2012-10
     dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
     individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
     role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) geoscientificInformation
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: irradiance_xrsa1
     attributeType:
   descriptor: irradiance at wavelengths between 0.05 and 0.4 nm calculated from XRS-A
solar minimum channel (photodiode)
   units:

    DerivedUnit:
     identifier: W m-2
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
   MemberName:
    aName: irradiance_xrsa2
    attributeType:
   descriptor: irradiance at wavelengths between 0.05 and 0.4 nm calculated from XRS-A solar maximum channel (quadrant photodiode)
    units:
     DerivedUnit:
     identifier: W m-2
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
   MemberName:
    aName: irradiance_xrsb1
    attributeType:
   descriptor: irradiance at wavelengths between 0.1 and 0.8 nm calculated from XRS-B solar minimum channel (photodiode)
    units:
     DerivedUnit:
     identifier: W m-2
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
   MemberName:
    aName: irradiance_xrsb2
    attributeType:
   descriptor: irradiance at wavelengths between 0.1 and 0.8 nm calculated from XRS-B solar maximum channel (quadrant photodiode)
    units:
     DerivedUnit:
     identifier: W m-2
     derivationUnitTerm:
     derivationUnitTerm:

---

 dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors

evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

    result: (DQ_QuantitativeResult)

      valueUnit:

       BaseUnit:

        identifier: percent

        unitsSystem:

      value:

  lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

      description: The ground processing algorithm (GPA) converts the raw data from all of the photodiodes for both XRS channels from digital numbers into electrical current using the integration time and the total diode gain factor, composed of the pre-flight temperature calibration value, the in-flight temporal calibration factor, and the gain linearity factor. The GPA calculates and removes the dark diode current, caused by the radiation background, the thermal contribution from the diode material and the temperature-dependent electrical offset from the measured current. The GPA sums the four currents for the solar maximum quadrant diode set. The GPA converts the solar minimum and the solar maximum currents to irradiance values using the instrument responsivity and the field-of-view correction generated from the EXIS Solar Position Sensor (SPS) pointing data and determines the primary irradiance for each channel based on a calibration threshold value. The GPA computes the 1-AU correction factor to the X-Ray fluxes to support the generation of higher-level products at a later time. The GPA also has a requirement to calculate the XRS ratio, XRS-A and XRS-B primary irradiances for use in the EUV solar flux end product processing.

      processor: (CI_ResponsibleParty)

       organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)

       role: (CI_RoleCode) processor

      processor: (CI_ResponsibleParty)

       organisationName: RBU (Remote Backup Unit, Fairmont, WV)

       role: (CI_RoleCode) processor

    output: (LE_Source)

      description: The solar flux X-Ray product consists of two irradiance measurements within the X-Ray spectrum of the Sun. The algorithm generates this product using XRS measurements of the solar flux in two channels: XRS-A covering 0.05-0.4 nm and XRS-B covering 0.1-0.8 nm. In order to span the full dynamic range of the X-Ray radiation over the approximate 11-year solar cycle, each channel of the XRS uses both a solar minimum photodiode and a solar maximum quadrant photodiode set. The solar minimum diode performs well during periods of low solar activity, but can saturate during high solar activity. The set of quadrant photodiodes provides good coverage of the X-Ray solar flux during high activity and flares, but may bottom-out during low activity. In addition, the individual signals in the quadrant provide a means for estimating the location of flares on the solar disk. The product data will contain a flag to indicate whether the solar minimum or solar maximum photodiodes correspond to the primary irradiance measurement for each channel. The X-Ray solar flux product also includes a set of quality flags to assess the state and health of the instrument, product metadata indicating the measurement details and quality of the product data, and intermediate data required for the

generation of higher-level products.

   processedLevel: (MD_Identifier)
    authority: (CI_Citation)
     title: NOAA Processing Levels
     date: (CI_Date)
      date: 2013-11
      dateType: (CI_DateTypeCode) revision
     citedResponsibleParty: (CI_ResponsibleParty)
     organisationName: National Oceanographic and atmospheric
Administration (NOAA) National Geophysical Data Center (NGDC)
      contactInfo: (CI_Contact)
       onlineResource: (CI_OnlineResource)
        linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
      role: (CI_RoleCode) publisher
    code: L1b

---

 metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information
about a product line that changes infrequently

---

 acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
   description: The Geostationary Operational Environmental Satellite-R Series (GOES-R)
is the United States Government geostationary weather satellite series having an operational life-
cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the
GOES-R series result in more timely and accurate forecasts and warnings than previous
generations, including the capability to image its near hemispherical field of view in five minutes.
The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and
lightning detection capability improves support for the detection and observations of
meteorological phenomena that directly affect public safety, protection of property, and
ultimately, economic health and development. The GOES-R series was a collaborative
development and acquisition effort between the National Oceanic and Atmospheric
Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The
GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's
Western Hemisphere and space weather monitoring. It is the primary tool for the detection and
tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of
Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis
stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit
storage. The satellite operates through periodic station-keeping and momentum transfer
maneuvers, which allow for near-continuous instrument observations.
   identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: http://science.nasa.gov/missions/goes-r/

date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/exis.html
          date:
        code: GOES-16 EXIS serial number
      type: Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)
      description: The EXIS contains two primary sensors, the Extreme Ultraviolet Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The instrument also includes the Sun Positioning Sensor (SPS).

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and

XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/exis.html
> > > > **date:**
> > > **code:** GOES-17 EXIS serial number
> > **type:** Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)
> > **description:** The EXIS contains two primary sensors, the Extreme Ultraviolet

Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The instrument also includes the Sun Positioning Sensor (SPS).

4.1.5   Energetic Heavy Ions Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f7087582-e5a8-11e3-ac10-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for SEISS Level 1b Energetic Heavy Ions Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
  dateStamp: 2017-05-11

metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SEIS-L1b-EHIS-ISO-SERIES_c20171311124000.xml

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R SEISS Level 1b Energetic Heavy Ions Product ISO Series Metadata
    alternateTitle: Data short name (DSN): SEIS-L1b-EHIS
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: SEIS-L1b-EHIS
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The GOES-R L1b Energetic Heavy Ions Product consists of heavy ion differential fluxes derived from in situ measurements of heavy ion count rates. Differential fluxes are produced for Hydrogen (H), Helium (He), Carbon-Nitrogen-Oxygen (CNO) mass group, Neon-Sulfur (Ne-S) mass group, Chlorine-Nickel (Cl-Ni) mass group, and Beryllium to Copper (Be-Cu) 26 elements group. For each mass and element group, the fluxes are produced for five energy bands, and one angular zone. The 5 energy bands are evenly spaced logarithmically spanning from 10 to 200 MeV/nucleon for H and He. The energy range for ions heavier than He is species-dependent and normalized such that, when focused into a beam and directed into a block of silicon, it corresponds to the same stopping range as He. The one angular zone has a central, anti-earthward look-angle (-Z direction in spacecraft body-reference-frame coordinates), and a 60 degree field-of-view. The product also contains processing and data quality metadata, satellite state and location information, and data required for the generation of level 2 products.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)
  address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ELECTRIC FIELDS/ELECTRIC CURRENTS
  keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ION CHEMISTRY/IONIZATION
  keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > HEAVY NUCLEI FLUX
  keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > ION FLUX
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
language: eng
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) geoscientificInformation
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: H5MinuteDifferentialFluxes
     attributeType:
   descriptor: Hydrogen (H) differential flux for each energy band
   units:
    DerivedUnit:
     identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: He5MinuteDifferentialFluxes
     attributeType:
   descriptor: Helium (He) differential flux for each energy band
   units:
    DerivedUnit:
     identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: CNO5MinuteDifferentialFluxes
     attributeType:
   descriptor: Carbon-Nitrogen-Oxygen (CNO) mass group differential flux for each
energy band
   units:
    DerivedUnit:
     identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:

derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: NeS5MinuteDifferentialFluxes
    attributeType:
  descriptor: Neon-Sulfur (Ne-S) mass group differential flux for each energy band
  units:
   DerivedUnit:
    identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: ClNi5MinuteDifferentialFluxes
    attributeType:
  descriptor: Chlorine-Nickel (Cl-Ni) mass group differential flux for each energy band
  units:
   DerivedUnit:
    identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: BeCu5MinuteDifferentialFluxes
    attributeType:
  descriptor: Beryllium to Copper (Be-Cu) differential flux for each element's energy
bands
  units:
   DerivedUnit:
    identifier: cm-2 sr-1 s-1 (MeV nuc-1)-1
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:
    derivationUnitTerm:

derivationUnitTerm:
derivationUnitTerm:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
        valueUnit:
         BaseUnit:
          identifier: percent
          unitsSystem:
        value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: SEISS EHIS L1b Calibration Algorithm (SECA) uses the EHIS data to produce heavy ion differential fluxes in the energy range from 10 to 200 MeV/nucleon. Differential fluxes are produced for Hydrogen (H), Helium (He), the C-N-O group, the Ne-S group and the Fe group. For each mass group, the fluxes are produced for five energy bands, and one angular zone. The 5 energy bands are evenly spaced logarithmically and range from 10 to 200 MeV/nuc (for H and He). The energy range for ions heavier than He is species-dependent and corresponds to the same stopping range (in Si) as He. The one angular zone has a central look-angle which is anti-earthward (-Z direction), and has a 60 degree field-of-view.
      processor: (CI_ResponsibleParty)
        organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
        role: (CI_RoleCode) processor
      processor: (CI_ResponsibleParty)
        organisationName: RBU (Remote Backup Unit, Fairmont, WV)
        role: (CI_RoleCode) processor
      output: (LE_Source)
      description: The GOES-R Energetic Heavy Ions L1b Space and Solar End-Product consists of fluxes of heavy ions derived from in situ measurements of heavy ion count rates. These measurements are retrieved from the Energetic Heavy Ion Sensor (EHIS) which is one of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS) to produce heavy ion differential fluxes in the energy range from 10 to 200 MeV/nucleon. Differential fluxes are produced for Hydrogen (H), Helium (He), the C-N-O group, the Ne-S group and the Fe group. For each mass group, the fluxes are produced for five energy bands, and one angular zone. The 5 energy bands are evenly spaced logarithmically and range from 10 to 200 MeV/nuc (for H and He). The energy range for ions heavier than He is species-dependent and corresponds to the same stopping range (in Si) as He. The one angular zone has a central look-angle which is anti-earthward (-Z direction), and has a 60 degree field-of-view.

processedLevel: (MD_Identifier)
  authority: (CI_Citation)
    title: NOAA Processing Levels
    date: (CI_Date)
      date: 2013-11
      dateType: (CI_DateTypeCode) revision
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: National Oceanographic and atmospheric
Administration (NOAA) National Geophysical Data Center (NGDC)
      contactInfo: (CI_Contact)
        onlineResource: (CI_OnlineResource)
          linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
      role: (CI_RoleCode) publisher
  code: L1b

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:

code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

  instrument: (MI_Instrument)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/seiss.html
        date:
      code: GOES-16 SEISS EHIS serial number
    type: SEISS Energetic Heavy Ion Sensor (EHIS)
    description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

  platform: (MI_Platform)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:
      code: GOES-West (G17)
    description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support,

process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html
            date:
          code: GOES-17 SEISS EHIS serial number
        type: SEISS Energetic Heavy Ion Sensor (EHIS)
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

4.1.6   Magnetospheric Electrons and Protons: Low Energy Product ISO Series Metadata

 (MI_Metadata)
  fileIdentifier: f7087583-e5a8-11e3-ac10-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for SEISS Level 1b Magnetospheric Electrons and Protons: Low Energy Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov

    role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SEIS-L1b-MPSL-ISO-SERIES_c20171311124000.xml

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    identificationInfo: (MD_DataIdentification)
      citation: (CI_Citation)
        title: GOES-R SEISS Level 1b Magnetospheric Electrons and Protons: Low Energy Product ISO Series Metadata
        alternateTitle: Data short name (DSN): SEIS-L1b-MPSL
        date: (CI_Date)
          date: 2017-05-11
          dateType: (CI_DateTypeCode) creation
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: gov.nesdis.noaa
            date: (CI_Date)
              date: 2014
              dateType: (CI_DateTypeCode) revision
          code: SEIS-L1b-MPSL
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
          contactInfo: (CI_Contact)
            address: (CI_Address)
              deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
              city: Silver Spring
              administrativeArea: MD
              postalCode: 20910
              country: USA
              electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
      abstract: The GOES-R Low Energy Magnetospheric Electrons and Protons L1b Space and Solar End-Product consists of fluxes of relatively low energy electrons and ions derived from in situ measurements of electron and ion count rates. These measurements are retrieved from the Magnetospheric Particle Sensor Low (MPS-LO) sensor which is one of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS). The MPS-LO fluxes are reported for two species (electrons and ions), 15 energy bands and 14 angular zones.
      pointOfContact: (CI_ResponsibleParty)
        organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
          contactInfo: (CI_Contact)
            address: (CI_Address)
              deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
              city: Silver Spring
              administrativeArea: MD
              postalCode: 20910
              country: USA
              electronicMailAddress: goes-r@noaa.gov

      NON-Export Controlled Information

      role: (CI_RoleCode) originator
    resourceFormat: (MD_Format)
     name: netCDF
     version: 4
    descriptiveKeywords: (MD_Keywords)
     keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ELECTRIC FIELDS/ELECTRIC CURRENTS
     keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ION CHEMISTRY/IONIZATION
     keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > SOLAR WIND
     keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > ELECTRON FLUX
     keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > ION FLUX
     type: (MD_KeywordTypeCode) theme
     thesaurusName: (CI_Citation)
      title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
      date: (CI_Date)
       date: 2012-10
       dateType: (CI_DateTypeCode) revision
      edition: Version 7.0.0.0.0
      citedResponsibleParty: (CI_ResponsibleParty)
       individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
        role: (CI_RoleCode) author
    resourceConstraints: (MD_SecurityConstraints)
     useLimitation: Unrestricted
     classification: (MD_ClassificationCode) unclassified
    language: eng
    characterSet: (MD_CharacterSetCode) utf8
    topicCategory: (MD_TopicCategoryCode) geoscientificInformation
    extent: (EX_Extent)
     temporalElement: (EX_TemporalExtent)
      extent:
       TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DiffElectronFluxes
     attributeType:
   descriptor: differential electron flux at specific energy bands for each zone's primary electron data channels

    units:
     DerivedUnit:
      identifier: cm-2 sr-1 s-1 keV-1
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DiffIonFluxes
     attributeType:
   descriptor: differential ion flux at specific energy bands for each zone's primary ion data channels
   units:
    DerivedUnit:
     identifier: cm-2 sr-1 s-1 keV-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:

---

 dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
     valueUnit:
      BaseUnit:
       identifier: percent
       unitsSystem:
     value:
  lineage: (LI_Lineage)
   processStep: (LE_ProcessStep)
    description: The SEISS MPS-LO L1b Calibration Algorithm (SMLCA) produces the MPS-LO electron and ion fluxes. The MPS-LO raw count rates are first corrected for the dead-time effect using a simple formula. For the out-of-band contamination correction, MPS-LO employs two shielded background channels. Only high-energy particles can penetrate the shielding and be counted in these background channels. These high-energy particles are assumed to also be contaminating the open-aperture channels. Counts from the background channels are first scaled by background removal coefficients, and then subtracted from the dead-time-corrected, open-aperture channel count rates to remove contamination. Finally, the dead-time corrected, and contamination-free count rates are normalized by the geometrical factor and energy band pass value to obtain directional-differential fluxes.
     processor: (CI_ResponsibleParty)
      organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)

    NON-Export Controlled Information

role: (CI_RoleCode) processor
processor: (CI_ResponsibleParty)
organisationName: RBU (Remote Backup Unit, Fairmont, WV)
role: (CI_RoleCode) processor
output: (LE_Source)
description: The GOES-R Low Energy Magnetospheric Electrons and Protons L1b Space and Solar End-Product consists of fluxes of relatively low energy electrons and ions derived from in situ measurements of electron and ion count rates. These measurements are retrieved from the Magnetospheric Particle Sensor Low (MPS-LO) sensor which is one of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS). The MPS-LO fluxes are reported for two species (electrons and ions), 15 energy bands and 14 angular zones.
processedLevel: (MD_Identifier)
authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
role: (CI_RoleCode) publisher
code: L1b

---

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
operation: (MI_Operation)
description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: http://science.nasa.gov/missions/goes-r/
    date:
  code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.
    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/seiss.html
          date:
        code: GOES-16 SEISS MPS_Lo serial number
      type: Magnetospheric Particle Sensor – Low Energy Range (MPS-Lo)
      description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.
  platform: (MI_Platform)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:
      code: GOES-West (G17)
    description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space

Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/seiss.html
> > > > **date:**
> > > **code:** GOES-17 SEISS MPS_Lo serial number
> > **type:** SEISS Magnetospheric Particle Sensor – Low Energy Range (MPS-Lo)
> > **description:** The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS),

the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

4.1.7   Magnetospheric Electrons and Protons: Medium and High Energy Product ISO Series Metadata

> (MI_Metadata)
> **fileIdentifier:** f7087584-e5a8-11e3-ac10-0800200c9a66
> **language:** eng
> **characterSet:** (MD_CharacterSetCode) utf8
> **parentIdentifier:** n/a
> **hierarchyLevel:** (MD_ScopeCode) series
> **hierarchyLevelName:** ISO Series Metadata for SEISS Level 1b Magnetospheric Electrons and Protons: Medium and High Energy Product Collection
> > **contact:** (CI_ResponsibleParty)
> > **organisationName:** DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
> > > **contactInfo:** (CI_Contact)
> > > > **address:** (CI_Address)
> > > > > **deliveryPoint:** 1335 East-West Highway, SSMC1, 8th Floor
> > > > > **city:** Silver Spring
> > > > > **administrativeArea:** MD
> > > > > **postalCode:** 20910
> > > > > **country:** USA

electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2
Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SEIS-L1b-MPSH-ISO-SERIES_c20171311125000.xml

---

identificationInfo: (MD_DataIdentification)
citation: (CI_Citation)
title: GOES-R SEISS Level 1b Magnetospheric Electrons and Protons: Medium
and High Energy Product ISO Series Metadata
alternateTitle: Data short name (DSN): SEIS-L1b-MPSH
date: (CI_Date)
date: 2017-05-11
dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
authority: (CI_Citation)
title: gov.nesdis.noaa
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) revision
code: SEIS-L1b-MPSH
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental
Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
abstract: The GOES-R Magnetospheric Electrons and Protons: Medium and High
Energy Product consists of fluxes of medium and high energy electrons and protons
derived from in situ measurements of electron and proton count rates. Differential and
integral electron fluxes are reported at eleven energy bands in five angular zones. Ten of
the energy bands are evenly spaced logarithmically spanning from 50 keV to 4 MeV with
differential electron flux being reported. The eleventh energy band collects electrons with
energies greater than 2 MeV with electron integral flux being reported. In addition,

differential proton fluxes are reported at eleven energy bands in the same five angular zones. The eleven proton energy bands are evenly spaced logarithmically and range from 80 keV to 12 MeV. Collectively, the five angular zones, each with a 30 degree field-of-view, span a total angular range of 170 degrees in the Y-Z arranged north to south with the central zone having an anti-earthward look-angle and are parallel to the minus Z-axis (in spacecraft body-reference-frame coordinates). With respect to the earth, the zones are arranged from north to south with the central zone pointing anti-earthward. In addition, the product contains ionizing radiation doses in two energy ranges, 50 keV to 1 MeV and 1 MeV to 10 MeV, obtained from a pair of Low and High Linear Energy Transfer dosimeters, respectively. The product also contains processing and data quality metadata, satellite state and location information, and data required for the generation of level 2 products.

pointOfContact: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

name: netCDF

version: 4

descriptiveKeywords: (MD_Keywords)

keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ELECTRIC FIELDS/ELECTRIC CURRENTS

keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > ELECTRON FLUX

keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > PROTON FLUX

keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE PROPERTIES > ENERGY DEPOSITION

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

date: (CI_Date)

date: 2012-10

           dateType: (CI_DateTypeCode) revision
          edition: Version 7.0.0.0.0
          citedResponsibleParty: (CI_ResponsibleParty)
           individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
           role: (CI_RoleCode) author
        resourceConstraints: (MD_SecurityConstraints)
         useLimitation: Unrestricted
         classification: (MD_ClassificationCode) unclassified
       language: eng
       characterSet: (MD_CharacterSetCode) utf8
       topicCategory: (MD_TopicCategoryCode) geoscientificInformation
       extent: (EX_Extent)
        temporalElement: (EX_TemporalExtent)
         extent:
          TimePeriod:
          beginPosition: 2017-05-11
          endPosition: now

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  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: DiffElectronFluxes
      attributeType:
    descriptor: differential electron flux at specific energy bands for each telescope's ten primary data channels
     units:
      DerivedUnit:
       identifier: cm-2 sr-1 s-1 keV-1
       derivationUnitTerm:
       derivationUnitTerm:
       derivationUnitTerm:
       derivationUnitTerm:
       derivationUnitTerm:
   dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:

aName: IntgElectronFluxes
attributeType:
descriptor: integral electron flux at energy band > 2000 keV for each telescope's primary data channel E11
units:
DerivedUnit:
identifier: cm-2 sr-1 s-1
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: DiffProtonFluxes
attributeType:
descriptor: differential proton flux at specific energy bands for each telescope's eleven primary data channels
units:
DerivedUnit:
identifier: cm-2 sr-1 s-1 keV-1
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:

---

dataQualityInfo: (DQ_DataQuality)
scope: (DQ_Scope)
level: (MD_ScopeCode) dataset
report: (DQ_CompletenessOmission)
nameOfMeasure: percent_uncorrectable_L0_errors
evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
result: (DQ_QuantitativeResult)
valueUnit:
BaseUnit:
identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)

description: The SEISS MPS-HI L1b Calibration Algorithm (SMHCA) produces the MPS-HI electron and proton fluxes. The MPS-HI raw count rates are first corrected for the dead-time effect using a simple formula. The proton count rates are assumed to be free from out-of-band contamination, based on pre-flight ground calibration activities. For the electron out-of-band contamination correction, the SMHCA will use data from the SEISS SGPS-X sensor unit (in particular, from Telescope 3) to correct the highest energy channels. Finally, the dead-time corrected, and contamination-free count rates for both protons and electrons are normalized by geometrical factors to obtain differential fluxes for the differential channels, and integral fluxes for the integral channels.

processor: (CI_ResponsibleParty)

organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)

role: (CI_RoleCode) processor

processor: (CI_ResponsibleParty)

organisationName: RBU (Remote Backup Unit, Fairmont, WV)

role: (CI_RoleCode) processor

output: (LE_Source)

description: The GOES-R Medium and High Energy Magnetospheric Electrons and Protons L1b Space and Solar End-Product consists of fluxes of medium and high energy electrons and protons derived from in situ measurements of electon and proton count rates. These measurements are retrieved from the Magnetospheric Particle Sensor High (MPS-HI) sensor which is one of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS). The MPS-HI electron fluxes are reported for eleven energy bands and five angular zones. Ten of the energy bands are evenly spaced logarithmically and range from 50 keV to 4 MeV. Differential fluxes are reported for these bands. The eleventh energy channel collects electrons with energies greater than 2 MeV. Integral flux is reported for this channel. The MPS-Hi proton fluxes are also reported for eleven energy bands and five angular zones. However, all eleven of the proton energy bands are evenly spaced logarithmically and range from 80 keV to 12 MeV (i.e. there is no integral channel for the protons). Differential fluxes are reported for all eleven proton channels.

processedLevel: (MD_Identifier)

authority: (CI_Citation)

title: NOAA Processing Levels

date: (CI_Date)

date: 2013-11

dateType: (CI_DateTypeCode) revision

citedResponsibleParty: (CI_ResponsibleParty)

organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

contactInfo: (CI_Contact)

onlineResource: (CI_OnlineResource)

        linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
        role: (CI_RoleCode) publisher
    code: L1b

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

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  acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
      code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)
      identifier: (MD_Identifier)

authority: (CI_Citation)
   title: http://www.goes-r.gov
   date:
code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/seiss.html
         date:
      code: GOES-16 SEISS MPS_Hi serial number
   type: Magnetospheric Particle Sensor – High Energy Range (MPS-Hi)
   description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

platform: (MI_Platform)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
      code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere,

solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/seiss.html
> > > > **date:**
> > > **code:** GOES-17 SEISS MPS_Hi serial number
> > **type:** Magnetospheric Particle Sensor – High Energy Range (MPS-Hi)
> > **description:** The SEISS instrument suite consists of: the Energetic Heavy

Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

4.1.8   Solar and Galactic Protons Product ISO Series Metadata

(MI_Metadata)
> **fileIdentifier:** 67e28dc8-4a39-11e4-9e35-164230d1df67
> **language:** eng
> **characterSet:** (MD_CharacterSetCode) utf8
> **parentIdentifier:** n/a
> **hierarchyLevel:** (MD_ScopeCode) series
> **hierarchyLevelName:** ISO Series Metadata for SEISS Level 1b Solar and Galactic Protons Product Collection
> **contact:** (CI_ResponsibleParty)
> > **organisationName:** DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)
  address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SEIS-L1b-SGPS-ISO-SERIES_c20171311125000.xml

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identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R SEISS Level 1b Solar and Galactic Protons Product ISO Series Metadata
    alternateTitle: Data short name (DSN): SEIS-L1b-SGPS
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: SEIS-L1b-SGPS
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The GOES-R Solar and Galactic Protons L1b Space and Solar End-Product consists of fluxes of very high energy protons derived from in situ measurements of proton count rates. These measurements are retrieved from the two Solar and Galactic Proton Sensor (SGPS) sensor units, which are two of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS). SGPS data is measured by two sensor units: SGPS-X and

SGPS+X. One sensor unit faces east, while the other faces west. Their respective positions reverse upon execution, by the spacecraft, of the yaw flip maneuver. There are three telescopes on each of the sensor units. The three telescopes all have the same central look direction. Proton fluxes are produced for every primary energy band of each of the three telescopes for each sensor unit. Each telescope has a unique number of energy bands spanning a unique energy range. For each sensor unit, there are a total of 13 primary, differential energy bands spanning 1 to 500 MeV, and one primary, integral channel for > 500 MeV particles. Differential proton fluxes are produced from the 13 primary, differential channels. An integral proton flux is produced from the one primary, integral channel.

pointOfContact: (CI_ResponsibleParty)
 organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
 contactInfo: (CI_Contact)
  address: (CI_Address)
   deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
   city: Silver Spring
   administrativeArea: MD
   postalCode: 20910
   country: USA
   electronicMailAddress: goes-r@noaa.gov
 role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
 name: netCDF
 version: 4
descriptiveKeywords: (MD_Keywords)
 keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > ELECTRIC FIELDS/ELECTRIC CURRENTS
 keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > ALPHA PARTICLE FLUX
 keyword: SUN-EARTH INTERACTIONS > SOLAR ENERGETIC PARTICLE FLUX > PROTON FLUX
 type: (MD_KeywordTypeCode) theme
 thesaurusName: (CI_Citation)
  title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
  date: (CI_Date)
   date: 2012-10
   dateType: (CI_DateTypeCode) revision
  edition: Version 7.0.0.0.0
  citedResponsibleParty: (CI_ResponsibleParty)
   individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
resourceConstraints: (MD_SecurityConstraints)
 useLimitation: Unrestricted
 classification: (MD_ClassificationCode) unclassified
language: eng

characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) geoscientificInformation
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: T1_DifferentialProtonFluxes
     attributeType:
   descriptor: differential proton flux at specific energy bands for telescope 1's primary proton data channels on each of the two sensor units
    units:
     DerivedUnit:
      identifier: cm-2 sr-1 s-1 keV-1
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: T2_DifferentialProtonFluxes
     attributeType:
   descriptor: differential proton flux at specific energy bands for telescope 2's primary proton data channels on each of the two sensor units
    units:
     DerivedUnit:
      identifier: cm-2 sr-1 s-1 keV-1
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:

aName: T3_DifferentialProtonFluxes
attributeType:
descriptor: differential proton flux at specific energy bands for telescope 3's primary proton data channels on each of the two sensor units
units:
DerivedUnit:
identifier: cm-2 sr-1 s-1 keV-1
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: T3P11_IntegralProtonFlux
attributeType:
descriptor: integral proton flux at energy band > 500 MeV for telescope 3's primary integral data channel P11 on each of the two sensor units
units:
DerivedUnit:
identifier: cm-2 sr-1 s-1
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:

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dataQualityInfo: (DQ_DataQuality)
scope: (DQ_Scope)
level: (MD_ScopeCode) dataset
report: (DQ_CompletenessOmission)
nameOfMeasure: percent_uncorrectable_L0_errors
evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
result: (DQ_QuantitativeResult)
valueUnit:
BaseUnit:
identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The SEISS SGPS L1b Calibration Algorithm (SSCA) CSU produces proton fluxes for protons possessing the high energies indicative of their solar or galactic origins. SGPS data is measured by two sensor units: SGPS-X and SGPS+X. One sensor unit faces east, while the other faces west. Their respective positions reverse upon execution, by the spacecraft,

of the yaw flip maneuver. The SEISS SGPS L1b Calibration Algorithm (SSCA) produces the SGPS proton fluxes. Events (charged particles hitting a set of detectors) are not counted during those times when the instrument's processor is occupied with other tasks. This time interval, when events are not being counted, is known as "dead" time. The overall effect of having a dead time limitation is that the measured count rate is lower than the true count rate. Another instrumental limitation is that the measured count rate can be contaminated by charged particles of the wrong species, and/or having an energy outside of the desired energy range, and/or arriving at the detector from outside of the desired FOV. Collectively, this is known as "out-of-band" contamination. The SSCA will correct for these instrumental limitations.

      processor: (CI_ResponsibleParty)

        organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)

        role: (CI_RoleCode) processor

      processor: (CI_ResponsibleParty)

        organisationName: RBU (Remote Backup Unit, Fairmont, WV)

        role: (CI_RoleCode) processor

     output: (LE_Source)

      description: The GOES-R Solar and Galactic Protons L1b Space and Solar End-Product consists of fluxes of very high energy protons derived from in situ measurements of proton count rates. These measurements are retrieved from the two Solar and Galactic Proton Sensor (SGPS) sensor units, which are two of the 5 scientific sensor units comprising the GOES-R Space Environment In Situ Suite (SEISS). SGPS data is measured by two sensor units: SGPS-X and SGPS+X. One sensor unit faces east, while the other faces west. Their respective positions reverse upon execution, by the spacecraft, of the yaw flip maneuver. There are three telescopes on each of the sensor units. The three telescopes all have the same central look direction. Proton fluxes are produced for every primary energy band of each of the three telescopes for each sensor unit. Each telescope has a unique number of energy bands spanning a unique energy range. For each sensor unit, there are a total of 13 primary, differential energy bands spanning 1 to 500 MeV, and one primary, integral channel for > 500 MeV particles. Differential proton fluxes are produced from the 13 primary, differential channels. An integral proton flux is produced from the one primary, integral channel.

      processedLevel: (MD_Identifier)

       authority: (CI_Citation)

        title: NOAA Processing Levels

        date: (CI_Date)

         date: 2013-11

         dateType: (CI_DateTypeCode) revision

        citedResponsibleParty: (CI_ResponsibleParty)

        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

         contactInfo: (CI_Contact)

          onlineResource: (CI_OnlineResource)

           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

        role: (CI_RoleCode) publisher

      code: L1b

metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

acquisitionInformation: (MI_AcquisitionInformation)
   operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
         identifier: (MD_Identifier)
            authority: (CI_Citation)
               title: http://science.nasa.gov/missions/goes-r/
               date:
            code:
         status: (MD_ProgressCode) onGoing
         parentOperation:
         platform: (MI_Platform)
            identifier: (MD_Identifier)
               authority: (CI_Citation)
                  title: http://www.goes-r.gov
                  date:
               code: GOES-East (G16)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning

detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html
            date:
          code: GOES-16 SEISS SGPS serial numbers
        type: Solar and Galactic Proton Sensor - SGPS
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-West (G17)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html

date:
    code: GOES-17 SEISS SGPS serial numbers
    type: Solar and Galactic Proton Sensor - SGPS
    description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

4.1.9   Geomagnetic Field Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f5816f50-fd6d-11e3-a3ac-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for Magnetometer Level 1b Geomagnetic Field Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-17
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_MAG-L1b-GEOF-ISO-SERIES_c20171371644000.xml

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R Magnetometer Level 1b Geomagnetic Field Product ISO Series Metadata
      alternateTitle: Data short name (DSN): MAG-L1b-GEOF
      date: (CI_Date)

          NON-Export Controlled Information

    date: 2017-05-17
    dateType: (CI_DateTypeCode) creation
   identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: gov.nesdis.noaa
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
    code: MAG-L1b-GEOF
   citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
     address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
  abstract: The Geomagnetic Field product consists of the estimated ambient magnetic field in four coordinate reference frames, Earth Polar Normal, J2000 Earth-Centered Inertial, and the spacecraft's Body Reference Frame and Attitude Control Reference Frame. The product also includes the compensated (calibrated and misalignment corrected) magnetic field in the native reference frame for both the inboard and outboard magnetometers. Furthermore, the product includes inboard and outboard magnetometer status flags, processing and data quality metadata, satellite state and location information, and data required for the generation of level 2 products.
  pointOfContact: (CI_ResponsibleParty)
   organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
   contactInfo: (CI_Contact)
    address: (CI_Address)
     deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
     city: Silver Spring
     administrativeArea: MD
     postalCode: 20910
     country: USA
     electronicMailAddress: goes-r@noaa.gov
   role: (CI_RoleCode) originator
  resourceFormat: (MD_Format)
   name: netCDF
   version: 4
  descriptiveKeywords: (MD_Keywords)
   keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE DYNAMICS > MAGNETIC FIELDS/MAGNETIC CURRENTS
   keyword: SUN-EARTH INTERACTIONS > IONOSPHERE/MAGNETOSPHERE

       NON-Export Controlled Information

DYNAMICS > MAGNETIC STORMS
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
   title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
   date: (CI_Date)
    date: 2012-10
    dateType: (CI_DateTypeCode) revision
   edition: Version 7.0.0.0.0
   citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) geoscientificInformation
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-17
      endPosition: now

---

 contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: IB_Data
     attributeType:
   descriptor: Compensated InBoard magnetometer data (x, y, z)
   units:
    DerivedUnit:
     identifier: nT
     derivationUnitTerm:
     derivationUnitTerm:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: OB_Data
     attributeType:

descriptor: Compensated OutBoard magnetometer data (x, y, z)
units:
  DerivedUnit:
   identifier: nT
   derivationUnitTerm:
   derivationUnitTerm:

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  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
      level: (MD_ScopeCode) dataset
    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_L0_errors
      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
        result: (DQ_QuantitativeResult)
          valueUnit:
           BaseUnit:
            identifier: percent
            unitsSystem:
          value:
    lineage: (LI_Lineage)
      processStep: (LE_ProcessStep)
        description: The ground processing algorithm (GPA) for the magnetometer is required to convert the instrument raw data in scaled nanotesla (nT) to the three orthogonal components of the geomagnetic field in units of nT. The MAG L1b Algorithm applies calibration parameters to magnetometer data, performs the gradiometer calculations, and outputs the measured ambient magnetic field.
          processor: (CI_ResponsibleParty)
            organisationName: WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
            role: (CI_RoleCode) processor
          processor: (CI_ResponsibleParty)
            organisationName: RBU (Remote Backup Unit, Fairmont, WV)
            role: (CI_RoleCode) processor
          output: (LE_Source)
            processedLevel: (MD_Identifier)
              authority: (CI_Citation)
                title: NOAA Processing Levels
                date: (CI_Date)
                  date: 2013-11
                  dateType: (CI_DateTypeCode) revision
                citedResponsibleParty: (CI_ResponsibleParty)
                  organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
                    contactInfo: (CI_Contact)

    onlineResource: (CI_OnlineResource)
     linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
    role: (CI_RoleCode) publisher
   code: L1b

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 metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

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 acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
   description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://science.nasa.gov/missions/goes-r/
      date:
     code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)
     identifier: (MD_Identifier)
      authority: (CI_Citation)
       title: http://www.goes-r.gov
       date:
      code: GOES-East (G16)
     description: The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/mag.html
          date:
        code: GOES-16 MAG serial number
      type: Magnetometer
      description: The GOES-R Magnetometer provides measurements of the space environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products will be an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning

detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/mag.html
              date:
            code: GOES-17 MAG serial number
          type: Magnetometer
          description: The GOES-R Magnetometer will provide measurements of the space environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products will be an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

4.2 Level 1b Data

4.2.1 GRB Information ISO Series Metadata

(MI_Metadata)
  fileIdentifier: d60ed140-3a8a-11e3-aa6e-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for GRB Information Packets Dataset Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)

       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_GRB-INFO-ISO-SERIES_c20171311122000.xml

---

   identificationInfo: (MD_DataIdentification)
     citation: (CI_Citation)
       title: GOES-R GRB Information Dataset
       alternateTitle: Data short name (DSN): GRB-INFO-ACQ
       alternateTitle: Data short name (DSN): GRB-INFO-GLMP
       alternateTitle: Data short name (DSN): GRB-INFO-MSG
       alternateTitle: Data short name (DSN): GRB-INFO-NPRF
       alternateTitle: Data short name (DSN): GRB-INFO-SCH
       alternateTitle: Data short name (DSN): GRB-INFO-STAT
       alternateTitle: Data short name (DSN): GRB-INFO-SUVP
       date: (CI_Date)
         date: 2017-05-11
         dateType: (CI_DateTypeCode) creation
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: gov.nesdis.noaa
           date: (CI_Date)
             date: 2014
             dateType: (CI_DateTypeCode) revision
         code: GRB-INFO-*
       citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
         contactInfo: (CI_Contact)
           address: (CI_Address)
             deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
             city: Silver Spring
             administrativeArea: MD
             postalCode: 20910
             country: USA
             electronicMailAddress: goes-r@noaa.gov
         role: (CI_RoleCode) originator

      NON-Export Controlled Information

abstract: GRB information (GRB-INFO) provides data related to the operations, health and performance of the GOES-R series flight and ground system, and includes the following types of information: Satellite acquisition data; Mission schedule; Flight system status, ABI Image Navigation and Registration (INR) performance data, GLM INR performance data, SUVI INR performance data, and Operator message. Each of these types of GRB INFO exists as xml documents in separate CCSDS Space Packets.

pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: GRB INFO
  keyword: GRB INFO PACKETS
  keyword: GRB Information Packets
  keyword: GOES Rebroadcast
  type:
  thesaurusName:
descriptiveKeywords: (MD_Keywords)
  keyword: GOES > Geostationary Operational Environmental Satellites
  keyword: GOES-R > Geostationary Operational Environmental Satellite R
  type:
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodeau
      role: (CI_RoleCode) author
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode)
language: eng; USA

characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) geoscientificInformation
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:
   RecordType: GRB-INFO-ACQ
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: GRB INFO State, Position, and Velocity Vectors
      attributeType:
   descriptor: Satellite Acquisition Data contains the latitude and longitude of the satellite sub-point at 30 minute intervals. This data is used by ground terminals to acquire and lock on the GRB RF downlink signal. Nominally, the satellite acquisition data is updated daily, and spans the subsequent seven day period. The frequency of update and time-span associated with the satellite acquisition data may change. Note that the more time that has passed since the generation of the satellite acquisition data, the greater the error in the satellite's predicted location.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:
   RecordType: GRB-INFO-SCH
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: GRB INFO Schedule and Operations
      attributeType:
   descriptor: Mission Schedule contains a tailored set of scheduled operations and maintenance tasks that affect the ability of the GOES-R system to produce products, or the quality of the products. These tasks typically involve commanding the spacecraft or an instrument to perform an operation. The scheduled time frame associated with each task is included. This data indirectly provides GRB users with notification that product degradation and delivery interruptions will be occurring in the hours and days ahead due to planned satellite maintenance activities. Nominally, the mission schedule is updated daily, and spans the subsequent seven day period. The frequency of update and time-span associated with the mission schedule may change.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:
    RecordType: GRB-INFO-STAT
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
      MemberName:
        aName: GRB INFO Health and Status
        attributeType:
  descriptor: Flight System Status contains a configurable set of parameters, and their values and status that summarize the health and performance of the flight system. Parameters associated with the (1) communications, (2) command and data handling, (3) guidance, navigation, and control, (4) electrical power, (5) propulsion, (6) mechanical, (7) thermal control, or (8) instrument satellite subsystems, or aggregates thereof may be included. Nominally, the flight system status is updated daily. The frequency of update associated with the flight system status may change.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:
    RecordType: GRB-INFO-NPRF
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
      MemberName:
        aName: GRB INFO ABI INR Performance
        attributeType:
  descriptor: ABI INR Performance Data contains statistics that summarize the ABI image navigation and registration (INR) performance associated with the GOES-R system. In addition to monitoring INR performance of the ABI and overarching GOES-R system, this data is used by GRB users to assess the mapping accuracy of ABI Level 1b and Level 2+ product data. These statistics are calculated using ABI Level 1b Radiances product images and landmarks. The image to map, band to band (channel to channel) and within frame statistics derived using landmarks are available for those ABI bands that can see the earth's surface (i.e., ABI bands 1-3, 5-7, 11, and 13-16). The individual band statistics are aggregates, specifically 3-sigma values (i.e., sum of the absolute value of the mean value and three times the standard deviation), using measurements taken from individual images over a configurable sliding time window. Nominally, this sliding time window is set to 24 hours with the ABI INR performance data being updated daily. The sliding time window and frequency of update associated with the ABI INR performance data may change. As a result, if the sliding time window is configured to minutes up to several hours, and the ABI INR performance data is updated at a similar frequency, it is possible that at certain times during the day, no statistics are reported for the reflective bands (i.e., ABI bands 1-6) due to their inability to operate effectively at night.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:

RecordType: GRB-INFO-GLMP
contentType: (MD_CoverageContentTypeCode) thematicClassification
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: GRB INFO GLM INR Performance
    attributeType:
  descriptor: GLM INR Performance Data contains statistics that summarize the GLM INR performance associated with the GOES-R system. In addition to monitoring INR performance of the GLM and overarching GOES-R system, this data is used by GRB users to assess the mapping accuracy of the GLM Level 2+ Lightning Detection product data. These statistics are calculated using a background image observed by the GLM and downlinked periodically and landmarks. The statistics are aggregates, specifically 3-sigma values (i.e., sum of mean value and three times the standard deviation), using measurements taken from individual images over a configurable sliding time window. Nominally, this sliding time window is set to 24 hours, and the GLM INR performance data is updated daily. The sliding time window and frequency of update associated with the GLM INR performance data may change. As a result, if the sliding time window is configured to minutes up to several hours, and the GLM INR performance data is updated at a similar frequency, it is possible that at certain times during the day, no statistics are reported because of the inability of the GLM to generate satisfactory background images at night.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:
   RecordType: GRB-INFO-SUVP
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: GRB INFO SUVI INR Performance
      attributeType:
    descriptor: SUVI INR Performance Data contains statistics that summarize the SUVI INR performance associated with the GOES-R system. In addition to monitoring INR performance of the SUVI and overarching GOES-R system, this data is used by GRB users to assess the mapping accuracy of Level 1b SUVI Solar Imagery: EUV product data. These statistics are calculated using metadata fields in the SUVI Level 1b product that contain the location of the sun's center, which are based on information received from the Guide Telescope, and the SUVI Level 1b one second exposure 195.1 angstrom solar image, which is best for locating the edge of the solar disk. The statistics are aggregates using measurements taken from individual images over a configurable fixed time window. Nominally, this fixed time window is set to 20 minutes with the SUVI INR performance data being updated daily. The fixed time window and frequency of update associated with the SUVI INR performance data may change.

---

contentInfo: (MD_CoverageDescription)
  attributeDescription:

NON-Export Controlled Information

RecordType: GRB-INFO-MSG
contentType: (MD_CoverageContentTypeCode) thematicClassification
dimension: (MD_Band)
  sequenceIdentifier:
  MemberName:
    aName: Operator Message
    attributeType:
  descriptor: Operator Message contains a free-text message from a GOES-R system operator that has relevance to GRB users. The message may contain information about planned and unplanned product or service interruptions and anomalies, other anomalous conditions in the GOES-R ground or flight system, and product or service restoration information.

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metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode)
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
      code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)

identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: http://www.goes-r.gov
    date:
  code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

  instrument: (MI_Instrument)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/abi.html
        date:
      code:
    type: Advanced Baseline Imager
    description: The Advanced Baseline Imager is the primary instrument on the GOES-R Series for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-R Series ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

  instrument: (MI_Instrument)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/glm.html
        date:
      code:

type: Geostationary Lightning Mapper

description: The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 8 km continuously day and night over the Americas and adjacent ocean regions. The GLM provides early indication of storm intensification and severe weather events, improved tornado warning lead time, and data for long-term climate variability studies. The GLM provides information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

instrument: (MI_Instrument)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov/spacesegment/suvi.html

date:

code:

type: Solar Ultraviolet Imager - SUVI

description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. By observing the Sun, SUVI will be able to compile full disk solar images around the clock.

platform: (MI_Platform)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov

date:

code: GOES-West (G17)

description: The GOES-R System will acquire and disseminate environmental data from a near-equatorial Earth orbit at geostationary altitude. This includes the Earth's surface and atmosphere, solar activity, and geosynchronous space environment. The major functions of the GOES-R System are to support the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) support terrestrial and oceanographic Data Collection Platforms (DCPs), (2) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (3) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov/spacesegment/abi.html

date:

code:

type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-R Series for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten

infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-R Series ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% ($1\ \sigma$) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K ($1\ \sigma$) at 300K.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/glm.html
          date:
          code:
      type: Geostationary Lightning Mapper
      description: The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 10 km continuously day and night over the Americas and adjacent ocean regions. The GLM will provide early indication of storm intensification and severe weather events, improved tornado warning lead time of up to 20 minutes or more, and data for long-term climate variability studies. The GLM will provide information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/suvi.html
          date:
          code:
      type: Solar Ultraviolet Imager - SUVI
      description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. By observing the Sun, SUVI will be able to compile full disk solar images around the clock.

4.2.2   Sample Outlier Data ISO Series Metadata

  (MI_Metadata)
    fileIdentifier: 21798500-3a7a-11e3-aa6e-0800200c9a66
    language: eng
    characterSet: (MD_CharacterSetCode) utf8

parentIdentifier: n/a
hierarchyLevel: (MD_ScopeCode) series
hierarchyLevelName: ISO Series Metadata for ABI Sample Outlier Data File Collection
contact: (CI_ResponsibleParty)
   organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
   contactInfo: (CI_Contact)
     address: (CI_Address)
       deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
       city: Silver Spring
       administrativeArea: MD
       postalCode: 20910
       country: USA
       electronicMailAddress: GOES-R@noaa.gov
   role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_SOF-ISO-SERIES_c20171311307000.xml

---

identificationInfo: (MD_DataIdentification)
   citation: (CI_Citation)
     title: ABI Sample Outlier Data File
     alternateTitle: Data short name (DSN): ABI-L1b-SOF
     date: (CI_Date)
       date: 2017-05-11
       dateType: (CI_DateTypeCode) creation
     identifier: (MD_Identifier)
       authority: (CI_Citation)
         title: gov.nesdis.noaa
         date: (CI_Date)
           date: 2014
           dateType: (CI_DateTypeCode) revision
       code: ABI-L1b-SOF
     citedResponsibleParty: (CI_ResponsibleParty)
       organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
       contactInfo: (CI_Contact)
         address: (CI_Address)
           deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
           city: Silver Spring
           administrativeArea: MD
           postalCode: 20910
           country: USA
           electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

abstract: An outlier is an ABI fixed grid pixel in a specific band whose ABI L1b radiance value is outside of the product's measurement range because some of its constituent detector samples have radiance values indicating over-saturation. An ABI Sample Outlier Data file is a netCDF-4 file created for each ABI Radiances product image containing at least one outlier. A separate file created for each band, and in the case of band 2, a separate file is created for each of the five data paths. The band 2 data paths provide a partitioning of the high data volume associated with its 0.000014 radian horizontal spatial resolution to support concurrent processing in the instrument and ground system. An ABI Sample Outlier Data File contains resampled outlier radiance values, their corresponding Data Quality Flag, and the ABI fixed grid location of the resampled outlier. It also contains the source sample data received from the ABI, an ABI image chip (4 x 4 samples) for each resampled outlier pixel, along with a Data Quality Flag and the ABI fixed grid location for each of the 16 samples. This file is used to assess the impact of resampling saturated samples on product quality.

pointOfContact: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

name: netCDF

version: 4

descriptiveKeywords: (MD_Keywords)

keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > VISIBLE RADIANCE

keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS

keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > INFRARED RADIANCE

keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

date: (CI_Date)

date: 2012-10

dateType: (CI_DateTypeCode) revision

edition: Version 7.0.0.0.0

citedResponsibleParty: (CI_ResponsibleParty)

individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,

M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  language: eng; USA
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

---

  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: OutlierPixel
      attributeType:
    descriptor: Resampled pixel radiance value (channels 1 - 6)
    units:
     DerivedUnit:
      identifier: mW m-2 ster-1 um-1
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: OutlierPixel
      attributeType:

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descriptor: ABI L1b Radiances per pixel (channels 7 - 16)
units:
  DerivedUnit:
   identifier: mW m-2 sr-1 (cm-1)-1
   derivationUnitTerm:
   derivationUnitTerm:
   derivationUnitTerm:
   derivationUnitTerm:
  scaleFactor:
  offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: OutlierSamples
     attributeType:
   descriptor: The samples - 4x4 pixels - contributing to OutlierPixel. At least one is an outlier (channels 1 - 6)
   units:
    DerivedUnit:
     identifier: mW m-2 ster-1 um-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: OutlierSamples
     attributeType:
   descriptor: The samples - 4x4 pixels - contributing to OutlierPixel. At least one is an outlier (channels 7 - 16)
   units:
    DerivedUnit:

identifier: mW m-2 sr-1 (cm-1)-1
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: OutlierPixelDQF
      attributeType:
    descriptor: resampled outlier pixel data quality flag per pixel
    units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: OutlierSampleDQFs
      attributeType:
    descriptor: outlier sample radiance value data quality flags
    units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start and end time of the scene in seconds since J2000
epoch (2000-01-01 12:00:00).
    result:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: An outlier is an ABI fixed grid pixel in a specific band whose ABI L1b
radiance value is outside of the product's measurement range because some of its constituent

---

detector samples have radiance values indicating over-saturation. An ABI Sample Outlier Data file is a netCDF-4 file created for each ABI Radiances product image containing at least one outlier.

      processor: (CI_ResponsibleParty)
        organisationName: NESDIS/OSPO at WCDAS (Wallops Command and Data Acquisition Station, Chincoteague, VA)
        role: (CI_RoleCode) processor
      processor: (CI_ResponsibleParty)
        organisationName: NESDIS/OSPO at RBU (Remote Backup Unit, Fairmont, WV)
        role: (CI_RoleCode) processor
     output: (LE_Source)
      processedLevel: (MD_Identifier)
       authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
         date: 2013-11
         dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
         role: (CI_RoleCode) publisher
       code: L1b

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
     description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The

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GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

     identifier: (MD_Identifier)
       authority: (CI_Citation)
         title: http://science.nasa.gov/missions/goes-r/
         date:
         code:
     status: (MD_ProgressCode) onGoing
     parentOperation:
     platform: (MI_Platform)
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: http://www.goes-r.gov
           date:
         code: GOES-East (G16)
       description: The GOES-R System will acquire and disseminate environmental data from a near-equatorial Earth orbit at geostationary altitude. This includes the Earth's surface and atmosphere, solar activity, and geosynchronous space environment. The major functions of the GOES-R System are to support the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) support terrestrial and oceanographic Data Collection Platforms (DCPs), (2) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (3) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage from two locations, one at 75° West longitude and the second at 137° West longitude.

       instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/abi.html
            date:
          code: GOES-16 ABI instrument_id (serial number)
        type: Advanced Baseline Imager
        description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn

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tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)

> **description:** The GOES-R System will acquire and disseminate environmental data from a near-equatorial Earth orbit at geostationary altitude. This includes the Earth's surface and atmosphere, solar activity, and geosynchronous space environment. The major functions of the GOES-R System are to support the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) support terrestrial and oceanographic Data Collection Platforms (DCPs), (2) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (3) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage from two locations, one at 75° West longitude and the second at 137° West longitude.

> > **instrument:** (MI_Instrument)
> > > **identifier:** (MD_Identifier)
> > > > **authority:** (CI_Citation)
> > > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > > **date:**
> > > > **code:** GOES-17 ABI instrument_id (serial number)
> > > **type:** Advanced Baseline Imager

> **description:** The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

4.2.3   Instrument Calibration Data

(MI_Metadata)
  fileIdentifier: fbd4e2a0-3749-11e3-aa6e-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for GOES-R Instrument Calibration Data Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_CAL-ISO-SERIES_c20171311356000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R Instrument Calibration Data
      alternateTitle: Data short name (DSN): SAT-INST-CAL-EPH
      alternateTitle: Data short name (DSN): ABI-INST-CAL-ENG
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C01
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C02-1
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C02-2
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C02-3
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C02-4
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C02-5
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C03
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C04
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C05
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M2C06
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C01
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C02-1
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C02-2
      alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C02-3

alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C02-4
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C02-5
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C03
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C04
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C05
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C06
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C07
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C08
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C09
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C10
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alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C13
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alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C15
alternateTitle: Data short name (DSN): ABI-INST-CAL-M3C16
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C01
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C02-1
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C02-2
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C02-3
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C02-4
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C02-5
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alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C04
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C05
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C06
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C07
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C08
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C09
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C10
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C11
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C12
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C13
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C14
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C15
alternateTitle: Data short name (DSN): ABI-INST-CAL-M4C16
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C01
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C02-1
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C02-2
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C02-3
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C02-4
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C02-5
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C03
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C04
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C05
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C06
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C07

alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C08
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C09
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C10
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C11
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C12
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C13
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C14
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C15
alternateTitle: Data short name (DSN): ABI-INST-CAL-LUN-M3C16
alternateTitle: Data short name (DSN): EXIS-INST-CAL-ENG
alternateTitle: Data short name (DSN): GLM-INST-CAL-ENG
alternateTitle: Data short name (DSN): GLM-INST-CAL-BACK
alternateTitle: Data short name (DSN): SEIS-INST-CAL
alternateTitle: Data short name (DSN): SEIS-INST-CAL-ENG
alternateTitle: Data short name (DSN): SUVI-INST-CAL-ENG
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-093
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-131
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-171
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-195
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-284
alternateTitle: Data short name (DSN): SUVI-INST-CAL-IMG-303
alternateTitle: Data short name (DSN): SUVI-INST-CAL-DARK
alternateTitle: Data short name (DSN): MAG-INST-CAL-ENG
alternateTitle: Data short name (DSN): MAG-INST-CAL-MAN
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: *-INST-CAL-*
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The Instrument Calibration Data product contains the data needed to evaluate,

monitor, and trend sensor performance. ABI instrument calibration data contains engineering data (hourly generation), calibration data by timeline ID, and lunar data for each channel 1 - 16. This includes component temperatures, noise (NEDR - Noise Equivalent Delta Radiance, NEDT - Noise Equivalent Delta Temperature), calibration coefficients, blackbody counts, space view counts, Radiometric Platinum Resistance Thermometer (PRT) counts, Lunar scan, star catalog scan data, solar calibration target counts, and time and ephemeris data. Information for other instruments to be added.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

        address: (CI_Address)

          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

          city: Silver Spring

          administrativeArea: MD

          postalCode: 20910

          country: USA

          electronicMailAddress: goes-r@noaa.gov

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

      name: netCDF

      version: 4

    descriptiveKeywords: (MD_Keywords)

      keyword: SPECTRAL/ENGINEERING > VISIBLE WAVELENGTHS > SENSOR COUNTS

      keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS > SENSOR COUNTS

      keyword: SPECTRAL/ENGINEERING > PLATFORM CHARACTERISTICS > ORBITAL CHARACTERISTICS

      keyword: SPECTRAL/ENGINEERING > PLATFORM CHARACTERISTICS > ATTITUDE CHARACTERISTICS

      keyword: SPECTRAL/ENGINEERING > SENSOR CHARACTERISTICS

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

        date: (CI_Date)

          date: 2013

          dateType: (CI_DateTypeCode) revision

        edition: Version 7.0.0.0.0

        citedResponsibleParty: (CI_ResponsibleParty)

        individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodeau

          role: (CI_RoleCode) author

    resourceConstraints: (MD_SecurityConstraints)

      useLimitation: Unrestricted

      classification: (MD_ClassificationCode) unclassified

language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) geoscientificInformation
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now

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contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: ehis_relative_hcr_priority_counts
     attributeType:
   descriptor: difference between Priority 3 (Hydrogen) and Priority 1 (Heavy Ions)
measured hardware coincident count rate for non-prime and prime condition. value should always
be positive
    units:
     DerivedUnit:
      identifier: count (3 s)-1
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: ehis_hcr_priority_count_rate
     attributeType:
   descriptor: measured hardware coincident count rate for the three EHIS priority
categories in non-prime and prime conditions
    units:
     DerivedUnit:
      identifier: count (3 s)-1
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: ehis_relative_pec_counts
     attributeType:

descriptor: percent of pulse height analysis event counts that are valid for the three EHIS priority categories
   units:
    DerivedUnit:
     identifier: percent
     derivationUnitTerm:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: ehis_dead_time_corrections
     attributeType:
   descriptor: energetic heavy ions count rate multiplicative dead-time correction factor for EHIS
   units:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: ehis_rear-entry_contamination_corrections
     attributeType:
   descriptor: rear-entry multiplicative contamination correction factor for each of the three EHIS priority categories
   units:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-hi_electron_singles_channel_count_rate
     attributeType:
   descriptor: measured electron singles channel count rate for each MPS-HI electron telescopes' logical detectors
   units:
    DerivedUnit:
     identifier: count s-1
     derivationUnitTerm:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-hi_proton_singles_channel_count_rate
     attributeType:
   descriptor: measured proton singles channel count rate for each MPS-HI proton

telescopes' logical detectors
   units:
    DerivedUnit:
     identifier: count s-1
     derivationUnitTerm:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-hi_electron_dead_time_corrections
     attributeType:
   descriptor: electron count rate dead-time correction factor in divisor form for each MPS-HI electron telescope
   units:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-hi_proton_dead_time_corrections
     attributeType:
   descriptor: proton count rate dead-time correction factor in divisor form for each MPS-HI proton telescope
   units:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-lo_electron_background_channel_count_rate
     attributeType:
   descriptor: average electron background channel count rate for each MPS-LO sensor head
   units:
    DerivedUnit:
     identifier: count s-1
     derivationUnitTerm:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: mps-lo_ion_background_channel_count_rate
     attributeType:
   descriptor: average ion background channel count rate for each MPS-LO sensor head
   units:

      DerivedUnit:
       identifier: count s-1
       derivationUnitTerm:
     scaleFactor:
     offset:
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: mps-lo_electron_dead_time_corrections
       attributeType:
     descriptor: electron count rate dead-time correction factor in divisor form for each MPS-LO angular zone's energy bands
     units:
     scaleFactor:
     offset:
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: mps-lo_ion_dead_time_corrections
       attributeType:
     descriptor: ion count rate dead-time correction factor in divisor form for each MPS-LO angular zone's energy bands
     units:
     scaleFactor:
     offset:
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: sgps-x_singles_channel_count_rate
       attributeType:
     descriptor: measured singles channel count rate for each SGPS-X telescope's detectors
     units:
      DerivedUnit:
       identifier: count s-1
       derivationUnitTerm:
     scaleFactor:
     offset:
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: sgps+x_singles_channel_count_rate
       attributeType:
     descriptor: measured singles channel count rate for each SGPS+X telescope's detectors
     units:
      DerivedUnit:
       identifier: count s-1
       derivationUnitTerm:

  scaleFactor:
  offset:
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: sgps-x_proton_dead_time_corrections
    attributeType:
  descriptor: proton count rate dead-time correction factor in divisor form for each SGPS-X telescope
  units:
  scaleFactor:
  offset:
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: sgps+x_proton_dead_time_corrections
    attributeType:
  descriptor: proton count rate dead-time correction factor in divisor form for each SGPS+X telescope
  units:
  scaleFactor:
  offset:
 rangeElementDescription: (MI_RangeElementDescription)
  name: SEISS Instrument Calibration Data
  definition: (EHIS) The EHIS data consists of the HCR priority count rate, which is the measured hardware coincident count rate for the three EHIS priority categories in both non-prime and prime conditions (i.e., Non-Prime_P1, Non-Prime_P2, Non-Prime_P3, Prime_P1, Prime_P2, and Prime_P3). The relative PEC counts are the percent of pulse height analysis event counts that are valid for the three EHIS priority categories, P1-Heavy_Ions, P2-Helium, and P3-Hydrogen. The dead-time corrections data represent the energetic heavy ions count rate multiplicative dead-time correction factor for EHIS. Finally, the rear-entry contamination corrections represent the rear-entry multiplicative contamination correction factor for each of the three EHIS priority categories. (SGPS) The SGPS data consists of the SGPS-X singles channel count rate, the SGPS+X singles channel count rate, the SGPS-X proton dead time corrections, and the SGPS+X proton dead time corrections. The data structures representing SGPS-X and SGPS+X singles channel count rates are both dependent upon the three SGPS telescopes, the three SGPS detectors, and the number of time samples. Both the SGPS-X dead time correction data and the SGPS+X dead time correction data are dependent on the number of SGPS telescopes, as well as the number of time samples. (MPS-Hi) The MPS-Hi data consists of the electron singles channel count, the proton singles channel count, the electron dead-time correction and the proton dead-time correction. The electron and proton singles channel counts are a function of the five MPS-HI telescopes, the four MPS-HI electron detectors, and the number of time samples. The MPS-HI electron and proton dead-time corrections are both a function of the number of MPS-HI telescopes and time samples. (MPS-Lo) The MPS-LO data consists of: the average electron background channel count rate for each of the two (R and L) sensor heads; the average ion background channel count rate for each of the two sensor heads; the electron count rate dead-time correction factor (in divisor form) for each MPS-LO angular zone; and the ion count rate dead-

time correction factor (in divisor form) for each MPS-LO angular zone. The electron and ion background channel count rates are array structures sized according to the two MPS-LO sensor heads, and the time samples. The dead-time correction data are sized according to the sixteen MPS-LO angular zones, fifteen MPS-LO energy steps, and the time samples.

      rangeElement:

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contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: SU_Telemetry
      attributeType:
    descriptor: EXIS instrument telemetry item value
    units:
    scaleFactor:
    offset:
  rangeElementDescription: (MI_RangeElementDescription)
    name: EXIS Instrument Calibration Engineering
    definition: EXIS telemetry data
    rangeElement:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: mag_dqf
      attributeType:
    descriptor: magnetometer data quality flags
    units:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: ib_mag_status
      attributeType:
    descriptor: inbound magnetometer status flags
    units:
    scaleFactor:

    NON-Export Controlled Information

     offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: ob_mag_status
        attributeType:
      descriptor: outbound magnetometer status flags
      units:
      scaleFactor:
      offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: ib_mag_x_coord, ib_mag_y_coord, ib_mag_z_coord
        attributeType:
      descriptor: inboard magnetometer raw x, y and z measurements
      units:
       DerivedUnit:
        identifier: count
        derivationUnitTerm:
      scaleFactor:
      offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: ob_mag_x_coord, ob_mag_y_coord, ob_mag_z_coord
        attributeType:
      descriptor: outboard magnetometer raw x, y and z measurements
      units:
       DerivedUnit:
        identifier: count
        derivationUnitTerm:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: MAG Instrument Calibration Data
      definition: The Magnetometer calibration data represents the level 0 instrument inboard and outboard measurement data, and corresponding status information, for a time period of one second collected during a calibration maneuver. This information consists of magnetometer data quality flags, inboard and outboard status flags, and inboard and outboard raw sensor measurements in x,y,z coordinates. The time of the Magnetometer observation is provided, expressed in seconds since the J2000 epoch starting from 1 January 2000 at 12:00:00. Each instance of the Magnetometer data quality flag indicates whether the 10 samples of the raw x,y,x inboard and outboard data are of good quality or is a missing value. The data quality flag is a vector that consists of 10 elements, in which each element has a unique flag value. In addition, the MAG Instrument Calibration Data file includes an inboard magnetometer status flag and an outboard magnetometer status flag, in which each such status flag is a 10 element vector.

NON-Export Controlled Information

rangeElement:

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contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: SU_Telemetry
      attributeType:
    descriptor: MAG instrument telemetry item value
    units:
    scaleFactor:
    offset:
  rangeElementDescription: (MI_RangeElementDescription)
    name: MAG Instrument Calibration Engineering
    definition: MAG telemetry data
    rangeElement:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: filterwheel1_position
      attributeType:
    descriptor: forward filter wheel setting
    units:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: filterwheel2_position
      attributeType:
    descriptor: aft filter wheel setting
    units:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:

aName: readout_side
attributeType:
descriptor: flags indicating the CCD readout configuration
units:
scaleFactor:
offset:
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: image
attributeType:
descriptor: SUVI miscellaneous calibration frame data (in digital numbers)
units:
DerivedUnit:
identifier: count
derivationUnitTerm:
scaleFactor:
offset:
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: DQF
attributeType:
descriptor: SUVI miscellaneous calibration frame data quality flags
units:
scaleFactor:
offset:
rangeElementDescription: (MI_RangeElementDescription)
name: SUVI Instrument Frame Calibration Data
definition: The SUVI miscellaneous calibration frame product is intended to represent data obtained during the calibration activities concerning CCD flat fields, light transfer measurements, visible light images, EXIS cross calibration, and focus checks. CCD flat fields are obtained bi-annually. Light transfer measurements are obtained quarterly and during eclipses. Visible light images are obtained at least daily, as are EXIS cross calibration measurements. Finally, the focus check is performed annually, at a minimum. These on-orbit calibration operations can be accomplished during normal operations using designated calibration slots in the four minute SUVI imaging sequence. The start time of the calibration frame product is expressed in seconds since 1 January 2000 at 12:00 UTC. The SUVI miscellaneous calibration frame product provides information concerning the wavelength of the image frame, expressed in units of Angstroms. Information is also included that describes the active position of each of the two filter wheels. The readout configuration of the CCD is provided. Finally, a raw data downlink CCSDS APID variable is included indicating that the SUVI miscellaneous calibration frame has been received. The calibration data file consists of an image array and an array of data quality flags (DQF). The image and DQF arrays are sized such that the extent is 1292 rows by 1330 columns. The data in the image array is expressed in terms of units of digital numbers (i.e., counts) and is of type short, with a valid range of 0 to 16383. The data quality flag is represented by an array in which each element is a byte data type.

rangeElement:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: image
     attributeType:
   descriptor: SUVI dark frame calibration data (in digital numbers)
   units:
    DerivedUnit:
     identifier: count
     derivationUnitTerm:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: SUVI dark frame calibration data quality flags
   units:
   scaleFactor:
   offset:
  rangeElementDescription: (MI_RangeElementDescription)
   name: SUVI Instrument Dark Frame Calibration Data
   definition: The SUVI dark frame calibration product is intended to measure the inherent bias and noise in the camera electronics, and to map permanently bad (i.e. hot) pixels. Such frames are taken as a standard exposure with the camera shutter closed. Ideally, a median dark frame is created for each exposure every four hours. The start time of the calibration frame product is expressed in seconds since 1 January 2000 at 12:00 UTC. The SUVI miscellaneous calibration frame product provides information concerning the readout configuration of the CCD. A raw data downlink CCSDS APID variable is included which indicates that the SUVI miscellaneous calibration frame has been received. The dark frame calibration data file consists of an image array and an array of data quality flags (DQF). The image and DQF arrays are sized such that the extent is 1292 rows by 1330 columns. The data in the image array is expressed in terms of units of digital numbers (i.e., counts). It is of type short, with a valid range of 0 to 16383. The data quality flag is represented by an array in which each element is a byte data type.
   rangeElement:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:

      RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: SU_Telemetry
        attributeType:
      descriptor: SUVI instrument telemetry item value
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: SUVI Instrument Calibration Engineering
      definition: SUVI telemetry data
      rangeElement:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: ict
        attributeType:
      descriptor: infrared calibration target data digital numbers for emissive bands
      units:
       DerivedUnit:
        identifier: count
        derivationUnitTerm:
      scaleFactor:
      offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: ict_nedn
        attributeType:
      descriptor: infrared calibration target calculated noise equivalent change in radiance
(NEdN) for detectors of emissive bands over single calibration sampling period
      units:
       DerivedUnit:
        identifier: mW m-2 sr-1 (cm-1)-1
        derivationUnitTerm:
      scaleFactor:
      offset:
    dimension: (MD_Band)

sequenceIdentifier:
 MemberName:
  aName: ict_nedt
  attributeType:
descriptor: infrared calibration target calculated noise equivalent differential temperature (NEdT) for detectors of emissive bands over single calibration sampling period
 units:
  DerivedUnit:
  identifier: K
  derivationUnitTerm:
 scaleFactor:
 offset:
dimension: (MD_Band)
 sequenceIdentifier:
  MemberName:
   aName: sct
   attributeType:
 descriptor: solar calibration target data digital numbers for reflective bands
 units:
  DerivedUnit:
   identifier: count
   derivationUnitTerm:
 scaleFactor:
 offset:
dimension: (MD_Band)
 sequenceIdentifier:
  MemberName:
   aName: sct_nedn
   attributeType:
 descriptor: solar calibration target calculated noise equivalent change in radiance (NEdN) for detectors of reflective bands over single calibration sampling period
 units:
  DerivedUnit:
   identifier: W m-2 sr-1 um-1
   derivationUnitTerm:
 scaleFactor:
 offset:
dimension: (MD_Band)
 sequenceIdentifier:
  MemberName:
   aName: sct_signal_to_noise
   attributeType:
 descriptor: solar calibration target calculated signal to noise ratio for detectors of reflective bands over single calibration sampling period calibration sampling period
 units:
 scaleFactor:
 offset:

dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: spacelook
    attributeType:
  descriptor: space look calibration data digital numbers for reflective and emissive bandscalibration sampling period
  units:
   DerivedUnit:
    identifier: count
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: spacelook_nedn
    attributeType:
  descriptor: space look calibration calculated noise equivalent change in radiance (NEdN) for detectors of reflective and emissive bands over single calibration sampling period
  units:
   DerivedUnit:
    identifier: W m-2 sr-1 um-1 for reflective bands, mW m-2 sr-1 (cm-1)-1 for emissive bands
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: spacelook_nedt
    attributeType:
  descriptor: space look calibration calculated noise equivalent differential temperature (NEdT) for detectors of emissive bands over single calibration sampling period over single calibration sampling period
  units:
   DerivedUnit:
    identifier: K
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: starlook
    attributeType:
  descriptor: calibrated star look radiance for detectors over single calibration sampling

period for applicable bands calibration sampling period over single calibration sampling period
      units:
        DerivedUnit:
          identifier: W m-2 sr-1 um-1
          derivationUnitTerm:
      scaleFactor:
      offset:
    dimension: (MD_Band)
      sequenceIdentifier:
        MemberName:
          aName: starlook_dqf
          attributeType:
      descriptor: calibrated detector star look radiance data quality flags for applicable bands
period over single calibration sampling period
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: ABI Instrument Calibration Data
      definition: The ABI instrument calibration product files contain data representative of the ABI Space Look, Infrared Calibration Target (ICT) (i.e., blackbody), Star Look Target, and Solar Calibration Target (SCT) (i.e., solar look target). These observations are dependent on the ABI band and the individual detectors. There are three types of Space Look observations. There is the Space Look associated with the beginning of a Mode 3, Mode 4 and Mode 6 timeline. Data from these observations are used in conjunction with the ICT observations to compute the gain coefficient of each detector of an ABI emissive band. There is also an SCT Space Look, which is essentially just a longer duration Space Look obtained at the time of the SCT observation to facilitate the computation of reflective band gain coefficients. The product data contain information on the ICT, SCT and Space Look, both in terms of the discrete measurement values, as well as in terms of the statistical metrics derived from them. The ICT statistical data are min, max, mean and standard deviation of the ICT detector samples for each detector of the ABI emissive channel of interest. Similarly, the SCT data contain min, max, mean and standard deviation of the SCT detector data for each detector of the ABI reflective channel of interest. ICT data are collected at the very beginning of the ABI Mode 3 timeline and the ABI Mode 4 timeline. This is followed by a Space Look observation. Such pairs of observations, taking into account the ABI scan mirror radiometric properties obtained at these times, leads to the computation of detector gain coefficient values. The remaining Space Look observations during a Mode 3 or Mode 4 sequence always precede a swath scan of the Earth. The ABI cal data products include the raw ICT counts, and the associated statistical metrics (min, max, mean, standard deviation). In addition, metrics quantifying detector sensitivity are included in the form of ICT NEdN values, and ICT NEdT values for each detector. SCT data are collected during the ABI diagnostic mode. Such observations occur daily or weekly in the very beginning of the GOES-R mission, gradually tapering off in frequency to several times per year as the end of mission life of GOES-R approaches. Each SCT observation is accompanied by an SCT Space Look, an extended duration version of the Space Look observation obtained during normal mode operations. The ABI cal data products include the raw SCT counts, and the associated statistical metrics (min, max, mean, standard deviation). In addition, metrics quantifying detector sensitivity are included

    NON-Export Controlled Information

in the form of SCT SNR values, and SCT NEdN values for each detector. Space Look data are provided for the ABI channel of interest. In normal mode operation, a Space Look observation takes place at the beginning of an ABI Mode 3 and Mode 4 observation in conjunction with the ICT observation. Subsequent Space Look observations are collected at the beginning of each Full Disk scan of the Earth. Along with the raw Space Look data, the ABI calibration files contain associated statistical metrics in the form of min, max, mean and standard deviation per detector for the ABI channel of interest. In addition, metrics quantifying detector sensitivity are provided in the form of Space Look NEdN and Space Look NEdT, where the latter metric is associated with emissive bands, only. Star look data are collected for ABI reflective channels during Mode 3, Mode 4 and Mode 6 operations. Nominally, six star scene observations are obtained during each such mode. There are a total of seven ABI star scene ID types. Star scene ID values of 4 through 9 represent one star scene for each reflective channel. Star scene ID 10 is reserved for a star scene observation associated with an emissive channel. The star look data is represented in the calibration product file in terms of calibrated radiances, data quality flags, and computed gain coefficients.

      rangeElement:

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  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: radiance
        attributeType:
      descriptor: lunar scan calibrated sample radiance values
      units:
       DerivedUnit:
        identifier: W m-2 sr-1 um-1 for reflective bands, mW m-2 sr-1 (cm-1)-1 for emissive bands
        derivationUnitTerm:
      scaleFactor:
      offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: radiance_dqf
        attributeType:
      descriptor: lunar scan calibrated sample radiance value data quality flags
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: ABI Instrument Calibration Lunar Scan
      definition: Lunar scan data is an off-earth mesoscale scene, and collected as part of an

ABI Mode 3 or Mode 6 timeline when the Moon is in the field of regard of the ABI instrument. The apparent size of the Moon in the field of regard of the ABI subtends a size suitable for coverage using the ABI mesoscale scene type consisting of two swaths. This data is collected for all ABI bands. Lunar scan data samples are radiometrically calibrated. The Moon's surface is scanned for calibration purposes only. Separate files are created for each band and each occurrence of an ABI Mode 3 or Mode 6 timeline, which correspond to fifteen and 10 minutes, respectively. In the case of band 2, five different files are created, one for each of the data paths. The band 2 data paths provide a partitioning of the high data volume associated with its 0.000014 radian horizontal spatial resolution to support concurrent processing in the instrument and ground system.

       rangeElement:

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  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: SU_Telemetry
        attributeType:
      descriptor: ABI instrument telemetry item value
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: ABI Instrument Calibration Engineering
      definition: ABI telemetry data
      rangeElement:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: image
        attributeType:
      descriptor: GLM native background image (in digital numbers)
      units:
       DerivedUnit:
        identifier: count
        derivationUnitTerm:
      scaleFactor:

        offset:
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: image_dqf
        attributeType:
      descriptor: GLM native background image data quality flags
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: GLM Instrument Calibration
      definition: The GLM generates a background image periodically, interleaved with the detection of events in support of detecting false events, and instrument calibration. A background image is a scene composed of the background from all detector elements in the focal plane.
      rangeElement:

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  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: SU_Telemetry
        attributeType:
      descriptor: GLM instrument telemetry item value
      units:
      scaleFactor:
      offset:
    rangeElementDescription: (MI_RangeElementDescription)
      name: GLM Instrument Calibration Engineering
      definition: GLM telemetry data
      rangeElement:

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  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) physicalMeasurement
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: attitudeTimes
        attributeType:
      descriptor: time of the attitude observation (Q0, Q1, Q2, and Q3) in seconds since J2000

      NON-Export Controlled Information

epoch (2000-01-01 12:00:00)
    units:
     DerivedUnit:
      identifier: seconds since 2000-01-01 12:00:00
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: orbitTimes
      attributeType:
    descriptor: time of the orbit observation (x, y, z, theta_x, theta_y, theta_z) in seconds
since J2000 epoch (2000-01-01 12:00:00)
    units:
     DerivedUnit:
      identifier: seconds since 2000-01-01 12:00:00
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: x
      attributeType:
    descriptor: x-position of the spacecraft in the J2000 inertial reference frame
    units:
     DerivedUnit:
      identifier: km
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: y
      attributeType:
    descriptor: y-position of the spacecraft in the J2000 inertial reference frame
    units:
     DerivedUnit:
      identifier: km
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:

    aName: z
    attributeType:
  descriptor: z-position of the spacecraft in the J2000 inertial reference frame
  units:
   DerivedUnit:
    identifier: km
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: theta-x
    attributeType:
  descriptor: x-velocity of the spacecraft in the J2000 inertial reference frame
  units:
   DerivedUnit:
    identifier: km s-1
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: theta-y
    attributeType:
  descriptor: y-velocity of the spacecraft in the J2000 inertial reference frame
  units:
   DerivedUnit:
    identifier: km s-1
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: theta-z
    attributeType:
  descriptor: z-velocity of the spacecraft in the J2000 inertial reference frame
  units:
   DerivedUnit:
    identifier: km s-1
    derivationUnitTerm:
  scaleFactor:
  offset:
dimension: (MD_Band)
  sequenceIdentifier:

MemberName:
  aName: Q0
  attributeType:
descriptor: Q0 = cos(phi / 2). phi is the angle between the J2000 reference and body
frame of reference
units:
scaleFactor:
offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: Q1
    attributeType:
descriptor: Q1 = e1 * sin(phi / 2). phi is the angle between the J2000 reference and body
frame of reference. e1 is a component of the unit rotation vector u in either frame
units:
scaleFactor:
offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: Q2
    attributeType:
descriptor: Q2 = e2 * sin(phi / 2). phi is the angle between the J2000 reference and body
frame of reference. e2 is a component of the unit rotation vector u in either frame
units:
scaleFactor:
offset:
dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: Q3
    attributeType:
descriptor: Q3 = e3 * sin(phi / 2). phi is the angle between the J2000 reference and body
frame of reference. e3 is a component of the unit rotation vector u in either frame
units:
scaleFactor:
offset:
rangeElementDescription: (MI_RangeElementDescription)
  name: Satellite Instrument Calibration Ephemeris
  definition: Satellite ephemeris data
  rangeElement:

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 metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information

about a collection of datasets of a product line that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-R-S-T
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of

distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

     instrument: (MI_Instrument)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/abi.html
        date:
        code:
      type: Advanced Baseline Imager
      description: The Advanced Baseline Imager is the primary instrument on the GOES-R Series for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-R Series ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

     instrument: (MI_Instrument)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/exis.html
        date:
        code:
      type: Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)
      description: The EXIS contains two primary sensors, the Extreme Ultraviolet Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The instrument also includes the Sun Positioning Sensor (SPS).

     instrument: (MI_Instrument)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/glm.html
        date:
        code:
      type: Geostationary Lightning Mapper
      description: The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 8 km continuously day and night over the Americas and adjacent ocean regions. The GLM provides early indication of storm

intensification and severe weather events, improved tornado warning lead time, and data for long-term climate variability studies. The GLM provides information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

       instrument: (MI_Instrument)
        identifier: (MD_Identifier)
         authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/mag.html
          date:
          code:
        type: Magnetometer
        description: The GOES-R Magnetometer provides measurements of the space environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products will be an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

       instrument: (MI_Instrument)
        identifier: (MD_Identifier)
         authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/seiss.html
          date:
          code:
        type: SEISS Energetic Heavy Ion Sensor (EHIS)
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

       instrument: (MI_Instrument)
        identifier: (MD_Identifier)
         authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/seiss.html
          date:
          code:
        type: Magnetospheric Particle Sensor – High Energy Range (MPS-Hi)
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data

Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html
            date:
            code:
        type: Magnetospheric Particle Sensor – Low Energy Range (MPS-Lo)
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html
            date:
            code:
        type: Solar and Galactic Proton Sensor - SGPS
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/suvi.html
            date:
            code:
        type: Solar Ultraviolet Imager - SUVI
        description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. By observing the Sun, SUVI will be able to compile full disk solar images around the clock.

     platform: (MI_Platform)
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: http://www.goes-r.gov
          date:

code: GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov/spacesegment/abi.html
date:
code:
type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on the GOES-R Series for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-R Series ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

instrument: (MI_Instrument)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov/spacesegment/exis.html
date:
code:
type: Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)

description: The EXIS contains two primary sensors, the Extreme Ultraviolet Sensor (EUVS) and the X-Ray Sensor (XRS), which will help scientists monitor activity on the Sun. EXIS will reside on the Sun Pointing Platform mounted in the yoke of the solar array. The

instrument also includes the Sun Positioning Sensor (SPS).

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/glm.html
            date:
          code:
        type: Geostationary Lightning Mapper
        description: The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 8 km continuously day and night over the Americas and adjacent ocean regions. The GLM provides early indication of storm intensification and severe weather events, improved tornado warning lead time, and data for long-term climate variability studies. The GLM provides information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/mag.html
            date:
          code:
        type: Magnetometer
        description: The GOES-R Magnetometer provides measurements of the space environment magnetic field that controls charged particle dynamics in the outer region of the magnetosphere. These particles can be dangerous to spacecraft and human spaceflight. The geomagnetic field measurements are important for providing alerts and warnings to many customers, including satellite operators and power utilities. GOES Magnetometer data are also important in research, being among the most widely used spacecraft data by the national and international research community. The GOES-R Magnetometer products will be an integral part of the National Oceanic and Atmospheric Administration (NOAA) space weather operations, providing information on the general level of geomagnetic activity and permitting detection of sudden magnetic storms. In addition, measurements will be used to validate large-scale space environment models that are used in operations. The MAG requirements are similar to the tri-axial fluxgates that have previously flown. GOES-R requires measurements of three components of the geomagnetic field with a resolution of 0.016 nT and response frequency of 2.5 Hz.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/seiss.html
            date:
          code:
        type: SEISS Energetic Heavy Ion Sensor (EHIS)
        description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This

includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/seiss.html
              date:
              code:
          type: Magnetospheric Particle Sensor – High Energy Range (MPS-Hi)
          description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/seiss.html
              date:
              code:
          type: Magnetospheric Particle Sensor – Low Energy Range (MPS-Lo)
          description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/seiss.html
              date:
              code:
          type: Solar and Galactic Proton Sensor - SGPS
          description: The SEISS instrument suite consists of: the Energetic Heavy Ion Sensor (EHIS), the Magnetospheric Particle Sensors - High and Low (MPS-HI and MPS-LO), and the Solar and Galactic Proton Sensor (SGPS). The instrument suite also includes the Data Processing Unit (DPU). The EHIS is responsible for measuring heavy ion fluxes in the magnetosphere to provide a complete picture of the energetic particles surrounding Earth. This includes particles trapped within Earth's magnetosphere and particles arriving directly from the sun and cosmic rays which have been accelerated by electromagnetic fields in space.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)

    title: http://www.goes-r.gov/spacesegment/suvi.html
    date:
      code:
   type: Solar Ultraviolet Imager - SUVI
    description: The GOES-R Solar Ultraviolet Imager is a telescope that monitors the Sun in the extreme ultraviolet wavelength range. By observing the Sun, SUVI will be able to compile full disk solar images around the clock.

4.2.4 Level 1b Semi-Static Source Data ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f9d6dbe0-e4a6-11e5-a837-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for GOES-R L1b Processing Parameters Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-15
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_PARM-L1b-ISO-SERIES_c20171351620000.xml

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: GOES-R L1b Processing Parameters
      alternateTitle: Data short name (DSN): PARM-L1b-ISO-SERIES
      date: (CI_Date)
        date: 2017-05-15
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: Product Definition and Users Guide (PUG) Volume 1: Main

> **date:** (CI_Date)
> > **date:** 2016
> > **dateType:** (CI_DateTypeCode) revision
> **code:** GOES-R Document Control Number: 7035538
> **citedResponsibleParty:** (CI_ResponsibleParty)
> **organisationName:** DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
> > **contactInfo:** (CI_Contact)
> > **address:** (CI_Address)
> > > **deliveryPoint:** 1335 East-West Highway, SSMC1, 8th Floor
> > > **city:** Silver Spring
> > > **administrativeArea:** MD
> > > **postalCode:** 20910
> > > **country:** USA
> > > **electronicMailAddress:** goes-r@noaa.gov
> > **role:** (CI_RoleCode) originator

abstract: Processing parameters are used as a direct input to the GOES-R ground processing algorithms. There are six categories of semi-static source data used in the Advanced Baseline Imager (ABI) Level 1b ground processing algorithm, 1) Coverage calibration parameters (associated with the location of the ABI in geostationary orbit, global reference ellipsoid used to geolocate raw and resampled ABI imagery, ABI's field of regard, and instrument sensing rate), 2) Radiometric calibration parameters (associated with the instrument's radiometric observing characteristics, or its raw outputs), 3) Calibration target parameters (associated with the calibration performed by the instrument during operations including the internal calibration (i.e., blackbody), and space, solar, and star looks), 4) Geometric calibration parameters (associated with resampling, and the related geolocating of raw and resampled instrument data), 5) Kalman filter calibration parameters (associated with the Kalman filter used to support geolocation of raw samples and resampled pixels), 6) Algorithm processing parameters (used during service initiation, the processing of science data and to format data in preparation for producing an end product). There are three categories of Solar Ultraviolet Imagery (SUVI) processing parameters, 1) Radiometric calibration parameters and images (associated with the instrument's radiometric observing characteristics, or its raw outputs), 2) Geometric calibration parameters (associated with the precise look angle and size of the instrument's field of view), 3) Algorithm processing parameters (associated with configurable decision-making logic in the algorithm related to data identification, data, time, and position thresholds, and conversion factors). There are three categories of Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS) Solar Flux Extreme Ultraviolet processing parameters, 1) Sensor calibration parameters are used by the algorithms to calibrate the raw signals recorded by the instrument components into engineering units, 2) Solar calibration parameters are those associated with the distance, on a daily basis, between the earth and the sun, 3) Model processing parameters are those associated with the EUV spectrum proxy model. There are two categories of EXIS Solar Flux X-Ray processing parameters, 1) Sensor calibration parameters are those associated with the XRS and SPS sensors' radiometric and geometric observing characteristics, its raw outputs, and the subsequent calibration related processing, 2) Solar calibration parameters are those associated with the distance, on a daily basis, between the earth and the sun. There are two categories of SEISS processing parameters, 1) Sensor calibration parameters are those associated with the sensor's observing characteristics, or its raw outputs, 2) Algorithm processing parameters are those associated with configurable decision-making logic in the algorithm. Magnetometer uses four categories of processing parameters, 1) Factory calibration parameters are those associated with sensor and electronic temperature dependent, and alignment corrections required that were determined pre-launch, 2) On-orbit calibration

parameters are those that account for launch shift and in-flight drifts. These parameters are applied to the compensated (factory calibrated) magnetic field measurements, 3) Sensor calibration parameters are those associated with magnetometer hardware, valid telemetry ranges, and coordinate transformation matrices, 4) Algorithm processing parameters are those associated with the gradiometer model, and valid time and temperature thresholds.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

       address: (CI_Address)

        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

        city: Silver Spring

        administrativeArea: MD

        postalCode: 20910

        country: USA

        electronicMailAddress: goes-r@noaa.gov

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

     name: zip

     version:

    descriptiveKeywords: (MD_Keywords)

     keyword: Earth Observation Satellites > GOES (Geostationary Operational Environmental Satellite) > GOES-R

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

       title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

       date: (CI_Date)

        date: 2012-10

        dateType: (CI_DateTypeCode) revision

       edition: Version 7.0.0.0.0

       citedResponsibleParty: (CI_ResponsibleParty)

        individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

        role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

     keyword: semi-static processing parameters

    resourceConstraints: (MD_SecurityConstraints)

     useLimitation: Unrestricted

     classification: (MD_ClassificationCode) unclassified

    language: eng; USA

    characterSet: (MD_CharacterSetCode) utf8

    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere

    extent: (EX_Extent)

     temporalElement: (EX_TemporalExtent)

      extent:

       TimePeriod:

       beginPosition: 2017-05-15

                                       NON-Export Controlled Information

endPosition: now

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information
about a collection of datasets of a product line that changes infrequently

4.2.5   Level 1b Algorithm Packages

(MI_Metadata)
  fileIdentifier: 6c77a140-3769-11e3-aa6e-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for GOES-R L1b Algorithm Package Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for
imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ALG-L1b-ISO-SERIES_c20171311357000.xml

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R L1b Algorithm Package
    alternateTitle: Data short name (DSN): ALG-L1b-ISO-SERIES
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)

title: gov.nesdis.noaa
date: (CI_Date)
  date: 2014
  dateType: (CI_DateTypeCode) revision
code: ALG-L1b-ISO-SERIES
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: Each Algorithm Package includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), and descriptive information. Each ATBD will include an overview, logic flow, assumptions, theoretical/math description, limitations, exception handling, inputs/outputs, and software implementation considerations.
pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: zip
  version:
descriptiveKeywords: (MD_Keywords)
keyword: Earth Observation Satellites > GOES (Geostationary Operational Environmental Satellite) > GOES-R
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.

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Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
          role: (CI_RoleCode) author
    descriptiveKeywords: (MD_Keywords)
      keyword: Algorithm Package
    resourceConstraints: (MD_SecurityConstraints)
      useLimitation: Unrestricted
      classification: (MD_ClassificationCode) unclassified
    language: eng; USA
    characterSet: (MD_CharacterSetCode) utf8
    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
    extent: (EX_Extent)
      temporalElement: (EX_TemporalExtent)
        extent:
         TimePeriod:
          beginPosition: 2017-05-11
          endPosition: now

---

  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
      level: (MD_ScopeCode) series
    lineage: (LI_Lineage)
      source: (LI_Source)
        description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), for the following algorithms: Advanced Baseline Imager (ABI) Radiance Channel 1 through ABI Radiance Channel 16 algorithms. Also CDRL0080-1_ABI_GPA_Overview, CDRL0080-2_ABI_GPA_Decompression, CDRL0080-3_ABI_GPA_Calibration, CDRL0080-4_ABI_GPA_Navigation, CDRL0080-5_ABI_GPA_Resampler, CDRL0080-6_ABI_GPA_ScanCal. For EXIS, SUVI, MAG, GLM and SEISS the CDRL 80 - Algorithm documents are included.
      source: (LI_Source)
        description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), and applicable CDRL documents for the following algorithm: Magnetometer (MAG).
      source: (LI_Source)
        description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), and applicable CDRL documents for the following algorithm: Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS).
      source: (LI_Source)
        description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), and applicable CDRL documents for the following algorithm: Space Environment In-Situ Suite (SEISS) sensors.
      source: (LI_Source)
        description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary),and applicable CDRL documents for the following algorithm: Solar Ultraviolet Imager (SUVI).

                NON-Export Controlled Information

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

5.0   LEVEL 2+ PRODUCT AND DATA ISO SERIES METADATA

5.1   Level 2+ Products

5.1.1   Cloud and Moisture Imagery Product ISO Series Metadata

(MI_Metadata)
fileIdentifier: 8c9e8150-3692-11e3-aa6e-0800200c9a66
language: eng
characterSet: (MD_CharacterSetCode) utf8
parentIdentifier: n/a
hierarchyLevel: (MD_ScopeCode) series
hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud and Moisture Imagery Product Collection
contact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ABI-L2-CMIP-ISO-SERIES_c20171311130000.xml

spatialRepresentationInfo: (MD_Georectified)
numberOfDimensions: 2
axisDimensionProperties: (MD_Dimension)
dimensionName: (MD_DimensionNameTypeCode) row
dimensionSize: 10848
resolution:
Distance: 1
axisDimensionProperties: (MD_Dimension)

      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 10848
      resolution:
        Distance: 1
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk; ABI Channels 1, 3, 5

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 3000
    resolution:
      Distance: 1
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 5000
    resolution:
      Distance: 1
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS; ABI Channels 1, 3, 5

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1000
    resolution:
      Distance: 1
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 1000
    resolution:
      Distance: 1
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft

transformationDimensionDescription: Mesoscale; Channels 1, 3, 5

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 21696
    resolution:
      Distance: 0.5
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 21696
    resolution:
      Distance: 0.5
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk; ABI Channel 2

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 6000
    resolution:
      Distance: 0.5
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 10000
    resolution:
      Distance: 0.5
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS; ABI Channels 2

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 2000
    resolution:

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       Distance: 0.5
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 2000
      resolution:
        Distance: 0.5
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Mesoscale; Channel 2

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
        Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk; ABI Channels 4 and 6 - 16

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1500
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 2500
      resolution:
        Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false

         NON-Export Controlled Information

pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: CONUS; ABI Channels 4 and 6 - 16

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale; Channels 4 and 6 - 16

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
     code: goes_projection
     codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Cloud and Moisture Imagery Product
    alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C01
    alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C02

alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C03
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C04
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C05
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C06
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C07
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C08
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C09
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C10
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C11
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C12
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C13
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C14
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C15
alternateTitle: Data short name (DSN): ABI-L2-CMIPM1-M3C16
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C01
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C02
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C03
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C04
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C05
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C06
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C07
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C08
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C09
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C10
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C11
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C12
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C13
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C14
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C15
alternateTitle: Data short name (DSN): ABI-L2-CMIPM2-M3C16
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C01
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C02
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C03
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C04
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alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C06
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C07
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C08
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C09
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C10
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alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C15
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M3C16
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M4C01

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alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M4C07
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alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M4C09
alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M4C10
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alternateTitle: Data short name (DSN): ABI-L2-CMIPC-M4C15
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alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M3C02
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alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M3C04
alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M3C05
alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M3C06
alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M3C07
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alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M4C04
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alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M4C07
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alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M4C14
alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M4C15
alternateTitle: Data short name (DSN): ABI-L2-CMIPF-M4C16

alternateTitle: Data short name (DSN): ABI-L2-MCMIPC-M3
alternateTitle: Data short name (DSN): ABI-L2-MCMIPC-M4
alternateTitle: Data short name (DSN): ABI-L2-MCMIPF-M3
alternateTitle: Data short name (DSN): ABI-L2-MCMIPF-M4
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L2-*CMIP*
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
abstract: The Cloud and Moisture Imagery product contains one or more Earth-view images with pixel values identifying "brightness values" that are scaled to support visual analysis. The product includes data quality information that provides an assessment of the cloud and moisture imagery data values for on-earth pixels. Cloud and Moisture Imagery product files are generated for each of the sixteen ABI reflective bands (channels 1 - 6 with wavelengths 0.47, 0.64, 0.87, 1.38, 1.61, 2.25 microns respectively) and emissive bands (channels 7 - 16 with wavelengths 3.89, 6.17, 6.93, 7.34, 8.44, 9.61, 10.33, 11.19, 12.27, 13.27 microns respectively). In addition, there is a multi-band product file where the imagery at all bands is included. The imagery value for the reflective bands, ABI bands 1 through 6, is a dimensionless "reflectance factor" quantity that is normalized by the solar zenith angle. These bands support the characterization of clouds, vegetation, snow/ice, and aerosols. The imagery value for the emissive bands, ABI bands 7 through 16, is the brightness temperature at the Top-Of-Atmosphere (TOA) in Kelvin. These bands supports the characterization of the surface, clouds, water vapor, ozone, volcanic ash and dust based on emissive properties.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring

administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)
keyword: ATMOSPHERE > ATMOSPHERIC RADIATION > REFLECTANCE
keyword: SPECTRAL/ENGINEERING > INFRARED WAVELENGTHS >
BRIGHTNESS TEMPERATURE
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0
citedResponsibleParty: (CI_ResponsibleParty)
individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
keyword: toa_lambertian_equivalent_albdeo_multiplied_by_cosine_solar_zenith_angle
keyword: toa_brightness_temperature
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: CF Standard Name Table v25
date: (CI_Date)
date: 2013-07-05
dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
useLimitation: Unrestricted
classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
distance:
Distance: .5
spatialResolution: (MD_Resolution)
distance:
Distance: 1
spatialResolution: (MD_Resolution)
distance:
Distance: 2
language: eng; USA

characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)

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Product Definition and User's Guide (PUG)
Appendix X
01 June 2020   DCN 7035538, Revision J.1

code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: CMI
     attributeType:
   descriptor: ABI Cloud and Moisture Imagery reflectance factor (channels 1 - 6)
   units:
   scaleFactor:
   offset:
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: CMI
     attributeType:
   descriptor: ABI Cloud and Moisture Imagery brightness temperature at top of atmosphere (channels 7 - 16)
   units:
    DerivedUnit:
     identifier: k
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Cloud and Moisture Imagery Product data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset

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report: (DQ_QuantitativeAttributeAccuracy)
 nameOfMeasure: Product summary statistics
 evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Solar radiance and irradiance values that vary as a function of the Earth-Sun distance and planck constants used for cloud and moisture imagery correction; Number of geolocated pixels; Number of good and conditionally usable pixels; Number of cloud and moisture imagery pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the cloud and moisture imagery values in the product image. The cloud and moisture imagery outlier count and minimum, maximum, mean, and standard deviation values are calculated using good and conditionally usable quality pixels. The percentages of pixels assigned to each DQF value are also included in the product.
 result:
report: (DQ_CompletenessOmission)
 nameOfMeasure: percent_uncorrectable_L0_errors
 evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
 result: (DQ_QuantitativeResult)
  valueUnit:
   BaseUnit:
    identifier: percent
    unitsSystem:
  value:
report: (DQ_CompletenessOmission)
 nameOfMeasure: percent_uncorrectable_GRB_errors
 evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
 result: (DQ_QuantitativeResult)
  valueUnit:
   BaseUnit:
    identifier: percent
    unitsSystem:
  value:
lineage: (LI_Lineage)
 processStep: (LE_ProcessStep)
  description: The Cloud and Moisture product is generated by the GOES-R ABI Cloud and Moisture Imagery ground processing algorithm. Production of the reflective bands depends on the solar radiance at the Earth-Sun distance at the time of observation, and the solar zenith angle. The inverse of the solar radiance is represented by the "kappa0" variable in the product file. The dynamic range of the reflectance factor and brightness temperature output is not constrained by the algorithm but it is compared to the expected measurement range for each band based on the ABI's dynamic range.
  processor: (CI_ResponsibleParty)
   organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
    role: (CI_RoleCode)
  output: (LE_Source)
   description: Advanced Baseline Imager (ABI) L2 Cloud and Moisture Imagery data

are digital maps of clouds, moisture, and atmospheric windows, through which land and water are observed, from radiances for the visible, near-IR, and IR bands with associated per-pixel quality flag array. End-products are unique to an ABI scene (Full Disk, CONUS or Mesoscale) and ABI channel (1 - 16).

       processedLevel: (MD_Identifier)
        authority: (CI_Citation)
          title: NOAA Processing Levels
          date: (CI_Date)
            date: 2013-11
            dateType: (CI_DateTypeCode) revision
          citedResponsibleParty: (CI_ResponsibleParty)
            organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
            contactInfo: (CI_Contact)
              onlineResource: (CI_OnlineResource)
                linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
            role: (CI_RoleCode) publisher
        code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: http://science.nasa.gov/missions/goes-r/
    date:
  code:
status: (MD_ProgressCode) ongoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-16 ABI instrument_id (serial number)
      type: Advanced Baseline Imager
      description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60

      NON-Export Controlled Information

seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> > **instrument:** (MI_Instrument)
> > > **identifier:** (MD_Identifier)
> > > > **authority:** (CI_Citation)
> > > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > > **date:**
> > > > **code:** GOES-17 ABI instrument_id (serial number)
> > > **type:** Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.2   Clear Sky Mask Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: b015d6f0-b002-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Clear Sky Mask Product
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-ACM-ISO-SERIES_c20171311303000.xml

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  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
       Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
       Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2

axisDimensionProperties: (MD_Dimension)
  dimensionName: (MD_DimensionNameTypeCode) row
  dimensionSize: 1500
  resolution:
    Distance: 2
axisDimensionProperties: (MD_Dimension)
  dimensionName: (MD_DimensionNameTypeCode) column
  dimensionSize: 2500
  resolution:
    Distance: 2
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+
Products
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) publication
        otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for
geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized

location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

      code: goes_projection
      codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Clear Sky Mask Product
    alternateTitle: Data short name (DSN): ABI-L2-ACMM1-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACMM2-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACMC-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACMC-M4
    alternateTitle: Data short name (DSN): ABI-L2-ACMF-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACMF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-ACM*
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Clear Sky Mask product contains an image in the form of a binary cloud mask that identifies pixels within a coverage region as clear or cloudy. The production of the clear sky mask is an important step in the processing of many other GOES-R Level 2+ products that use the information generated in the production of the clear sky mask to determine the presence of cloud. The product includes data quality information for the binary cloud mask data values for on-earth pixels. The binary cloud mask value is a dimensionless quantity. The Clear Sky Mask product image is provided at 2 km resolution on the ABI fixed grid for Full Disk,

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CONUS, and Mesoscale coverage regions. Product data is produced for geolocated source data to local zenith angles of 90 degrees for both daytime and nighttime conditions.

pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator

resourceFormat: (MD_Format)
  name: netCDF
  version: 4

descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > CLOUDS > CLOUD AMOUNT/FREQUENCY
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author

descriptiveKeywords: (MD_Keywords)
  keyword: cloud_binary_mask
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision

resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified

spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

spatialResolution: (MD_Resolution)
  distance:
    Distance: 2

language: eng; USA

characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)

code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: BCM
      attributeType:
    descriptor: The Binary Cloud Mask (BCM) defines the detection of a cloud with a value of 1 for the mask otherwise the value of the mask is 0 for clear
      units:
      scaleFactor:
      offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) qualityInformation
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: DQF
      attributeType:
    descriptor: ABI Level 2+ Clear Sky Mask data quality flags
      units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of pixels and percentages of the intermediate 4-level cloud mask image having clear, probably clear, cloudy, and probably cloudy classifications; Applicable ABI emissive band-specific brightness temperature differences minimum, maximum, mean, and standard deviation values between those observed and modeled for all and clear sky conditions. These statistics are calculated using good quality pixels to a local zenith angle of 70 degrees. The percentages of pixels assigned to each DQF value are also included in the product.
    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors

evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

    result: (DQ_QuantitativeResult)

      valueUnit:

       BaseUnit:

        identifier: percent

        unitsSystem:

      value:

  report: (DQ_CompletenessOmission)

    nameOfMeasure: percent_uncorrectable_GRB_errors

    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors

    result: (DQ_QuantitativeResult)

      valueUnit:

       BaseUnit:

        identifier: percent

        unitsSystem:

      value:

  lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

      description: The Clear Sky Mask product is generated by the GOES-R ABI Cloud Mask ground processing algorithm. The Cloud Mask algorithm is an important component of the GOES-R Level 2+ Algorithm Precedence Network, as the output of the algorithm is used in the generation of the GOES-R Cloud, Aerosol, Sounding, Land, Ocean, Radiation, and Wind products. The Clear Sky Mask product algorithm identifies clear, probably clear, cloudy, and probably cloudy conditions based on spectral, spatial, and temporal tests. The algorithm compares ABI emissive band data with processed clear sky and cloudy sky model data derived from the Community Radiative Transfer Model (CRTM).

      processor: (CI_ResponsibleParty)

       organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

        role: (CI_RoleCode) processor

      output: (LE_Source)

       processedLevel: (MD_Identifier)

        authority: (CI_Citation)

         title: NOAA Processing Levels

         date: (CI_Date)

          date: 2013-11

          dateType: (CI_DateTypeCode) revision

        citedResponsibleParty: (CI_ResponsibleParty)

        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

         contactInfo: (CI_Contact)

          onlineResource: (CI_OnlineResource)

           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

         role: (CI_RoleCode) publisher

code: L2

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metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
      code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-East (G16)
    description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and

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XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > **date:**
> > > **code:** GOES-16 ABI instrument_id (serial number)
> > **type:** Advanced Baseline Imager
> > **description:** The Advanced Baseline Imager is the primary instrument on GOES-16

for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information

Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov/spacesegment/abi.html
date:
code: GOES-17 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.3   Cloud Top Phase Product ISO Series Metadata

(MI_Metadata)
fileIdentifier: 1f205b40-afd3-11e1-afa6-0800200c9a66
language: eng
characterSet: (MD_CharacterSetCode) utf8
parentIdentifier: n/a
hierarchyLevel: (MD_ScopeCode) series
hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Top Phase Product Collection
contact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD

        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-ACTP-ISO-SERIES_c20171311132000.xml

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
       Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
       Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1500
      resolution:
       Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 2500
      resolution:
       Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft

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transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+
Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for
geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized
location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from
a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the
same location on the earth. All of the dynamics associated with an orbiting satellite are removed
to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized
geostationary position.
     code: goes_projection
     codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Cloud Top Phase Product
    alternateTitle: Data short name (DSN): ABI-L2-ACTPM1-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACTPM2-M3

alternateTitle: Data short name (DSN): ABI-L2-ACTPC-M3
alternateTitle: Data short name (DSN): ABI-L2-ACTPC-M4
alternateTitle: Data short name (DSN): ABI-L2-ACTPF-M3
alternateTitle: Data short name (DSN): ABI-L2-ACTPF-M4
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L2-ACTP*
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator

abstract: The Cloud Top Phase product contains an image with pixel values identifying the presence of cloud in four phase categories. The categories, which are consistent with heritage NOAA and NASA cloud products, include: Warm liquid water: liquid water cloud with an opaque cloud temperature greater than 273 degrees K; Supercooled liquid water: liquid water topped cloud with an opaque cloud temperature less than 273 degrees K; Mixed phase clouds: high probability of containing both liquid water and ice near cloud top; Ice phase clouds: all ice topped clouds. The Cloud Top Phase product image data variable also has categories for clear sky and unknown phases. A pixel is classified as having an unknown phase when the retrieval has failed because of missing or bad input data. The product includes data quality information that provides an assessment of the cloud top phase data values for on-earth pixels. The cloud top phase value is a dimensionless quantity which is provided at 2 km resolution on the ABI fixed grid for Full Disk, CONUS, and Mesoscale coverage regions. Product data is produced for geolocated source data to local zenith angles of 90 degrees for both daytime and nighttime conditions.

pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring

      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > CLOUDS > CLOUD LIQUID WATER/ICE
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
        role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
  keyword: cloud_phase_category
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)

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geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:

aName: Phase
attributeType:
descriptor: ABI Level 2+ Cloud Top Phase
units:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Cloud Top Phase data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Percentage of pixels in each of the phase category; Number of cloudy pixels in the image. These statistics are calculated using geolocated pixels. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)
    valueUnit:

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BaseUnit:
  identifier: percent
  unitsSystem:
value:
lineage: (LI_Lineage)
  processStep: (LE_ProcessStep)
    description: The Cloud Top Phase product is generated by the GOES-R ABI Cloud Type ground processing algorithm. The algorithm determines the cloud top phase for pixels identified as cloudy, probably cloudy, and probably clear in the intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Clear sky is determined using clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm.
    processor: (CI_ResponsibleParty)
      organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
      role: (CI_RoleCode) processor
  output: (LE_Source)
    processedLevel: (MD_Identifier)
      authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
          date: 2013-11
          dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
          contactInfo: (CI_Contact)
            onlineResource: (CI_OnlineResource)
              linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
          role: (CI_RoleCode) publisher
      code: L2

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes.

The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

> **identifier:** (MD_Identifier)
>> **authority:** (CI_Citation)
>>> **title:** http://science.nasa.gov/missions/goes-r/
>>> **date:**
>>> **code:**
> **status:** (MD_ProgressCode) onGoing
> **parentOperation:**
> **platform:** (MI_Platform)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov
>>>> **date:**
>>> **code:** GOES-East (G16)

> **description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html
>>>> **date:**
>>> **code:** GOES-16 ABI instrument_id (serial number)

type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov

date:

code: GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov/spacesegment/abi.html

date:

code: GOES-17 ABI instrument_id (serial number)

type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions

between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.4   Cloud Top Height Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: 4571d650-b00c-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Top Height Product
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-ACHA-ISO-SERIES_c20171311133000.xml

---

   spatialRepresentationInfo: (MD_Georectified)
     numberOfDimensions: 2
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) row
       dimensionSize: 1086
       resolution:

      Distance: 10
   axisDimensionProperties: (MD_Dimension)
     dimensionName: (MD_DimensionNameTypeCode) column
     dimensionSize: 1086
     resolution:
      Distance: 10
   cellGeometry: (MD_CellGeometryCode) area
   transformationParameterAvailability: true
   checkPointAvailability: false
   pointInPixel: (MD_PixelOrientationCode) upperLeft
   transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
   numberOfDimensions: 2
   axisDimensionProperties: (MD_Dimension)
     dimensionName: (MD_DimensionNameTypeCode) row
     dimensionSize: 300
     resolution:
      Distance: 10
   axisDimensionProperties: (MD_Dimension)
     dimensionName: (MD_DimensionNameTypeCode) column
     dimensionSize: 500
     resolution:
      Distance: 10
   cellGeometry: (MD_CellGeometryCode) area
   transformationParameterAvailability: true
   checkPointAvailability: false
   pointInPixel: (MD_PixelOrientationCode) upperLeft
   transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
   numberOfDimensions: 2
   axisDimensionProperties: (MD_Dimension)
     dimensionName: (MD_DimensionNameTypeCode) row
     dimensionSize: 250
     resolution:
      Distance: 4
   axisDimensionProperties: (MD_Dimension)
     dimensionName: (MD_DimensionNameTypeCode) column
     dimensionSize: 250
     resolution:
      Distance: 4
   cellGeometry: (MD_CellGeometryCode) area
   transformationParameterAvailability: true
   checkPointAvailability: false

pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: GOES-R Product Definition and Users Guide (PUG)
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
      code: goes_projection
      codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Cloud Top Height Product
    alternateTitle: Data short name (DSN): ABI-L2-ACHAM1-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACHAM2-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACHAC-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACHAC-M4
    alternateTitle: Data short name (DSN): ABI-L2-ACHAF-M3
    alternateTitle: Data short name (DSN): ABI-L2-ACHAF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-ACHA*
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)

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      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
  abstract: The Cloud Top Height product contains an image with pixel values identifying the geopotential height at the top of a cloud layer. The product is generated in combination with the Cloud Top Temperature and Cloud Top Pressure products by the same algorithm. The product includes data quality information that provides an assessment of the cloud top height data values for on-earth pixels. The units of measure for the cloud top height value is meters. The Cloud Top Height product image is produced on the ABI fixed grid (at 10 km for Full Disk and CONUS coverage regions and at 4km for Mesoscale) under the following conditions: Cloudy; Geolocated source data to local zenith angles of 70 degrees for both daytime and nighttime conditions.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  resourceFormat: (MD_Format)
    name: netCDF
    version: 4
  descriptiveKeywords: (MD_Keywords)
    keyword: ATMOSPHERE > CLOUDS > CLOUD HEIGHT
    type: (MD_KeywordTypeCode) theme
    thesaurusName: (CI_Citation)
      title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
      date: (CI_Date)
        date: 2012-10
        dateType: (CI_DateTypeCode) revision
      edition: Version 7.0.0.0.0
      citedResponsibleParty: (CI_ResponsibleParty)
        individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
        role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
    keyword: geopotential_height_at_cloud_top
    type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)
  title: CF Standard Name Table v25
  date: (CI_Date)
    date: 2013-07-05
    dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
 useLimitation: Unrestricted.
 classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
 distance:
  Distance: 10
spatialResolution: (MD_Resolution)
 distance:
  Distance: 4
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
 temporalElement: (EX_TemporalExtent)
  extent:
   TimePeriod:
   beginPosition: 2017-05-11
   endPosition: now
extent: (EX_Extent)
 geographicElement: (EX_GeographicDescription)
  geographicIdentifier: (MD_Identifier)
   code: Full Disk - GOES-East
 geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: -156.2995
  eastBoundLongitude: 6.2995
  southBoundLatitude: -81.3282
  northBoundLatitude: 81.3282
extent: (EX_Extent)
 geographicElement: (EX_GeographicDescription)
  geographicIdentifier: (MD_Identifier)
   code: Full Disk - GOES-West
 geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: 141.7005
  eastBoundLongitude: -55.7005
  southBoundLatitude: -81.3282
  northBoundLatitude: 81.3282
extent: (EX_Extent)
 geographicElement: (EX_GeographicDescription)
  geographicIdentifier: (MD_Identifier)
   code: CONUS - GOES-East
 geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: -152.109282

eastBoundLongitude: -52.946879
southBoundLatitude: 14.571340
northBoundLatitude: 56.761450
extent: (EX_Extent)
geographicElement: (EX_GeographicDescription)
geographicIdentifier: (MD_Identifier)
code: CONUS - GOES-West
geographicElement: (EX_GeographicBoundingBox)
westBoundLongitude: 175.623576
eastBoundLongitude: -89.623576
southBoundLatitude: 14.571340
northBoundLatitude: 53.500062
extent: (EX_Extent)
geographicElement: (EX_GeographicDescription)
geographicIdentifier: (MD_Identifier)
code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) physicalMeasurement
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: HT
attributeType:
descriptor: ABI Level 2+ Cloud Top Height
units:
DerivedUnit:
identifier: m
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) thematicClassification
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: DQF
attributeType:
descriptor: ABI Level 2+ Cloud Top Height Product data quality flags

units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of cloudy or probably cloud pixels that qualify for the algorithm retrieval; Number of cloud top height pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the cloud top height values in the product image. These statistics are calculated using good quality pixels. The percentages of pixels assigned to each DQF value are also included in the product.
    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: The Cloud Top Temperature, Cloud Top Pressure, and Cloud Top Height products are generated by the GOES-R ABI Cloud Top Height ground processing algorithm. The Cloud Top Height algorithm is an important component of the GOES-R ground processing precedence chain as the output of the algorithm is used in the generation of other ABI Level 2+ products. The algorithm retrieves a state vector composed of cloud top temperature, channel 14 emissivity, and band 15/14 beta ratio. It is retrieved using an optimal estimation technique. Cloud top pressure and height are then derived from cloud top temperature. The channel 14 emissivity and band 15/14 beta ratio are output as intermediate products. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. Cloudy conditions are determined using cloudy and probably cloudy pixels indicated in the temporally

coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. The Cloud Top Height algorithm operates on 2 km resolution pixels, generating intermediate temperature, pressure, and height products at this resolution, but the delivered Cloud Top Height and Pressure products are aggregated to 4 km or 10 km as needed to satisfy end user product resolution requirements.

      processor: (CI_ResponsibleParty)

        organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

        role: (CI_RoleCode) processor

     output: (LE_Source)

      processedLevel: (MD_Identifier)

       authority: (CI_Citation)

        title: NOAA Processing Levels

        date: (CI_Date)

         date: 2013-11

         dateType: (CI_DateTypeCode) revision

        citedResponsibleParty: (CI_ResponsibleParty)

        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

         contactInfo: (CI_Contact)

         onlineResource: (CI_OnlineResource)

          linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

         role: (CI_RoleCode) publisher

      code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)

   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

   maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)

   operation: (MI_Operation)

    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's

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Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

> **identifier:** (MD_Identifier)
>> **authority:** (CI_Citation)
>>> **title:** http://science.nasa.gov/missions/goes-r/
>>> **date:**
>> **code:**
> **status:** (MD_ProgressCode) onGoing
> **parentOperation:**
> **platform:** (MI_Platform)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov
>>>> **date:**
>>> **code:** GOES-East (G16)

> **description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html
>>>> **date:**
>>> **code:** GOES-16 ABI instrument_id (serial number)
>> **type:** Advanced Baseline Imager
>> **description:** The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to

weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-17 ABI instrument_id (serial number)
      type: Advanced Baseline Imager
      description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6

scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.5   Cloud Top Pressure Product ISO Series Metadata

```
(MI_Metadata)
  fileIdentifier: aa36b140-b00d-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Top Pressure Product
Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-CTP-ISO-SERIES_c20171311300000.xml
```

```
  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1086
      resolution:
        Distance: 10
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 1086
      resolution:
        Distance: 10
```

cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 300
    resolution:
     Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
     Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
     code: goes_projection
     codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)

title: ABI Level 2+ Cloud Top Pressure Product
alternateTitle: Data short name (DSN): ABI-L2-CTPC-M3
alternateTitle: Data short name (DSN): ABI-L2-CTPC-M4
alternateTitle: Data short name (DSN): ABI-L2-CTPF-M3
alternateTitle: Data short name (DSN): ABI-L2-CTPF-M4
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L2-CTP*
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
abstract: The Cloud Top Pressure product contains an image with pixel values identifying the atmospheric pressure at the top of a cloud layer. The product is generated in combination with the Cloud Top Height and Cloud Top Temperature products by the same algorithm. The product includes data quality information that provides an assessment of the cloud top height data values for on-earth pixels. The units of measure for the cloud top pressure value is hectopascals. The Cloud Top Pressure product image is produced on the ABI fixed grid (at 10 km for Full Disk and CONUS coverage regions) under the following conditions: Cloudy; Geolocated source data to local zenith angles of 70 degrees for both daytime and nighttime conditions.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator

resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > CLOUDS > CLOUD TOP PRESSURE
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
  keyword: air_pressure_at_cloud_top
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
  Distance: 10
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995

        southBoundLatitude: -81.3282
        northBoundLatitude: 81.3282
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: Full Disk - GOES-West
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: 141.7005
       eastBoundLongitude: -55.7005
       southBoundLatitude: -81.3282
       northBoundLatitude: 81.3282
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: CONUS - GOES-East
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: -152.109282
       eastBoundLongitude: -52.946879
       southBoundLatitude: 14.571340
       northBoundLatitude: 56.761450
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: CONUS - GOES-West
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: 175.623576
       eastBoundLongitude: -89.623576
       southBoundLatitude: 14.571340
       northBoundLatitude: 53.500062

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: PRES
     attributeType:
   descriptor: ABI Level 2+ Cloud Top Pressure
   units:
    DerivedUnit:
     identifier: hPa
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:

offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Cloud Top Pressure data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of cloudy or probably cloud pixels that qualify for the algorithm retrieval; Number of cloud top pressure pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the cloud top pressure values in the product image. These statistics are calculated using good quality pixels. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:

    value:
   lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
     description: The Cloud Top Temperature, Cloud Top Pressure, and Cloud Top Height products are generated by the GOES-R ABI Cloud Top Height ground processing algorithm. The Cloud Top Height algorithm is an important component of the GOES-R ground processing precedence chain as the output of the algorithm is used in the generation of other ABI Level 2+ products. The algorithm retrieves a state vector composed of cloud top temperature, channel 14 emissivity, and band 15/14 beta ratio. It is retrieved using an optimal estimation technique. Cloud top pressure and height are then derived from cloud top temperature. The channel 14 emissivity and band 15/14 beta ratio are output as intermediate products. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. Cloudy conditions are determined using cloudy and probably cloudy pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. The Cloud Top Height algorithm operates on 2 km resolution pixels, generating intermediate temperature, pressure, and height products at this resolution, but the delivered Cloud Top Height and Pressure products are aggregated to 4 km or 10 km as needed to satisfy end user product resolution requirements.
     processor: (CI_ResponsibleParty)
      organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
      role: (CI_RoleCode) processor
     output: (LE_Source)
      processedLevel: (MD_Identifier)
       authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
         date: 2013-11
         dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
         role: (CI_RoleCode) publisher
       code: L2

---

 metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
        code: GOES-East (G16)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and

the second at 137° West longitude.

> **instrument:** (MI_Instrument)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html
>>>> **date:**
>>> **code:** GOES-16 ABI instrument_id (serial number)
>> **type:** Advanced Baseline Imager
>> **description:** The Advanced Baseline Imager is the primary instrument on GOES-16

for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov
>>>> **date:**
>>> **code:** GOES-West (G17)
>> **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html

           date:
              code: GOES-17 ABI instrument_id (serial number)
              type: Advanced Baseline Imager
              description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.6   Cloud Top Temperature Product ISO Series Metadata

 (MI_Metadata)
   fileIdentifier: 8c98eff0-afda-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Top Temperature Product
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)

dataSetURI: OR_ABI-L2-ACHT-ISO-SERIES_c20171311300000.xml

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 5424
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 5424
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: GOES-R Product Definition and Users Guide (PUG)
      date: (CI_Date)
        date: 2014

dateType: (CI_DateTypeCode) publication

otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

code: goes_projection

codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)

citation: (CI_Citation)

title: ABI Level 2+ Cloud Top Temperature Product

alternateTitle: Data short name (DSN): ABI-L2-ACHTM1-M3

alternateTitle: Data short name (DSN): ABI-L2-ACHTM2-M3

alternateTitle: Data short name (DSN): ABI-L2-ACHTF-M3

alternateTitle: Data short name (DSN): ABI-L2-ACHTF-M4

date: (CI_Date)

date: 2017-05-11

dateType: (CI_DateTypeCode) creation

identifier: (MD_Identifier)

authority: (CI_Citation)

title: gov.nesdis.noaa

date: (CI_Date)

date: 2014

dateType: (CI_DateTypeCode) revision

code: ABI-L2-ACHT*

citedResponsibleParty: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: goes-r@noaa.gov

role: (CI_RoleCode) originator

abstract: The Cloud Top Temperature product contains an image with pixel values identifying the atmospheric temperature at the top of a cloud layer. The product is generated in combination with the Cloud Top Height and Cloud Top Pressure products by the same algorithm. The product includes data quality information that provides an assessment of the cloud top height data values for on-earth pixels. The units of measure for the cloud top temperature value is kelvin.

The Cloud Top Temperature product image is produced on the ABI fixed grid at 2 km resolution for Full Disk and Mesoscale coverage regions. Product data is produced under the following conditions: cloudy; Geolocated source data to local zenith angles of 70 degrees for both daytime and nighttime conditions.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

       address: (CI_Address)

        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

        city: Silver Spring

        administrativeArea: MD

        postalCode: 20910

        country: USA

        electronicMailAddress: GOES-R@noaa.gov

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

     name: netCDF

     version: 4

    descriptiveKeywords: (MD_Keywords)

     keyword: ATMOSPHERE > CLOUDS > CLOUD TOP TEMPERATURE

     type: (MD_KeywordTypeCode) theme

     thesaurusName: (CI_Citation)

      title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

      date: (CI_Date)

       date: 2012-10

       dateType: (CI_DateTypeCode) revision

      edition: Version 7.0.0.0.0

      citedResponsibleParty: (CI_ResponsibleParty)

       individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

       role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

     keyword: air_temperature_at_cloud_top

     type: (MD_KeywordTypeCode) theme

     thesaurusName: (CI_Citation)

      title: CF Standard Name Table v25

      date: (CI_Date)

       date: 2013-07-05

       dateType: (CI_DateTypeCode) revision

    resourceConstraints: (MD_SecurityConstraints)

     useLimitation: Unrestricted.

     classification: (MD_ClassificationCode) unclassified

    spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

    spatialResolution: (MD_Resolution)

     distance:

    Distance: 2
  language: eng; USA
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
    temporalElement: (EX_TemporalExtent)
     extent:
      TimePeriod:
       beginPosition: 2017-05-11
       endPosition: now
  extent: (EX_Extent)
    geographicElement: (EX_GeographicDescription)
     geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
    geographicElement: (EX_GeographicBoundingBox)
     westBoundLongitude: -156.2995
     eastBoundLongitude: 6.2995
     southBoundLatitude: -81.3282
     northBoundLatitude: 81.3282
  extent: (EX_Extent)
    geographicElement: (EX_GeographicDescription)
     geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
    geographicElement: (EX_GeographicBoundingBox)
     westBoundLongitude: 141.7005
     eastBoundLongitude: -55.7005
     southBoundLatitude: -81.3282
     northBoundLatitude: 81.3282
  extent: (EX_Extent)
    geographicElement: (EX_GeographicDescription)
     geographicIdentifier: (MD_Identifier)
      code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: TEMP
      attributeType:
    descriptor: ABI Level 2+ Cloud Top Temperature
    units:
     DerivedUnit:
      identifier: k
      derivationUnitTerm:

scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Cloud Top Temperature data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of cloudy or probably cloud pixels that qualify for the algorithm retrieval; Number of cloud top temperature pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the cloud top temperature values in the product image. These statistics are calculated using good quality pixels. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent

unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The Cloud Top Temperature, Cloud Top Pressure, and Cloud Top Height products are generated by the GOES-R ABI Cloud Top Height ground processing algorithm. The Cloud Top Height algorithm is an important component of the GOES-R ground processing precedence chain as the output of the algorithm is used in the generation of other ABI Level 2+ products. The algorithm retrieves a state vector composed of cloud top temperature, channel 14 emissivity, and band 15/14 beta ratio. It is retrieved using an optimal estimation technique. Cloud top pressure and height are then derived from cloud top temperature. The channel 14 emissivity and band 15/14 beta ratio are output as intermediate products. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. Cloudy conditions are determined using cloudy and probably cloudy pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. The Cloud Top Height algorithm operates on 2 km resolution pixels, generating intermediate temperature, pressure, and height products at this resolution, but the delivered Cloud Top Height and Pressure products are aggregated to 4 km or 10 km as needed to satisfy end user product resolution requirements.
processor: (CI_ResponsibleParty)
organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
role: (CI_RoleCode) processor
output: (LE_Source)
processedLevel: (MD_Identifier)
authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc essing_Levels
role: (CI_RoleCode) publisher
code: L2

---

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

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acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
     status: (MD_ProgressCode) onGoing
     parentOperation:
     platform: (MI_Platform)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:
       code: GOES-East (G16)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and

the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-16 ABI instrument_id (serial number)
      type: Advanced Baseline Imager
      description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html

        NON-Export Controlled Information

      date:
        code: GOES-17 ABI instrument_id (serial number)
        type: Advanced Baseline Imager
        description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.7   Cloud Optical Depth ISO Series Metadata

 (MI_Metadata)
   fileIdentifier: 49b3d350-afec-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Optical Depth Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-COD-ISO-SERIES_c20171311132000.xml

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 2712
    resolution:
     Distance: 4
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2712
    resolution:
     Distance: 4
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products

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are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

      code: goes_projection
      codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Cloud Optical Depth Product
      alternateTitle: Data short name (DSN): ABI-L2-CODC-M3
      alternateTitle: Data short name (DSN): ABI-L2-CODC-M34
      alternateTitle: Data short name (DSN): ABI-L2-CODF-M3
      alternateTitle: Data short name (DSN): ABI-L2-CODF-M4
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: ABI-L2-COD*
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
    abstract: The Cloud Optical Depth product contains an image with pixel values identifying the measure of the extinction due to condensed water or ice clouds at a wavelength of 0.64 um. Separate algorithms are used for daytime, solar zenith angle to 82 degrees, and nighttime, solar zenith angle greater than 82 degrees, conditions. The product is generated in combination with the Cloud Particle Size product by the same algorithms. The product includes data quality information that identifies whether the daytime or nighttime algorithm generated the pixel, and provides an assessment of the cloud optical depth data values for on-earth pixels. The cloud

optical depth value is a dimensionless quantity. The Cloud Optical Depth product image is produced on the ABI fixed grid at 4 km resolution for Full Disk and 2 km resolution for CONUS coverage regions. Product data is produced under the following conditions for the daytime algorithm: Cloudy; Geolocated source data to local zenith angles of 65 degrees and to solar zenith angles of 82 degrees. Product data generated by the nighttime algorithm is produced under the following conditions: Cloudy; Geolocated source data to local zenith angles of 70 degrees and solar zenith angles between 82 and 180 degrees. The cloud optical depth values reported range from 0 to 160. The sensitivity of the product to high optical depths is limited for nighttime conditions to the nighttime maximum threshold, which is an optical depth value of 16. Cloud Optical Depth product data is identified as degraded in the terminator region, which is a solar zenith angle between 65 and 82 degrees for the daytime algorithm, and 82 and 90 degrees for the nighttime algorithm.

    pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
    resourceFormat: (MD_Format)
      name: netCDF
      version: 4
    descriptiveKeywords: (MD_Keywords)
      keyword: ATMOSPHERE > CLOUDS > CLOUD OPTICAL DEPTH/THICKNESS
      type: (MD_KeywordTypeCode) theme
      thesaurusName: (CI_Citation)
        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
        date: (CI_Date)
          date: 2012-10
          dateType: (CI_DateTypeCode) revision
        edition: Version 7.0.0.0.0
        citedResponsibleParty: (CI_ResponsibleParty)
          individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
          role: (CI_RoleCode) author
    descriptiveKeywords: (MD_Keywords)
      keyword: atmosphere_optical_thickness_due_to_cloud
      type: (MD_KeywordTypeCode) theme
      thesaurusName: (CI_Citation)
        title: CF Standard Name Table v25
        date: (CI_Date)

    date: 2013-07-05
    dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
spatialResolution: (MD_Resolution)
  distance:
   Distance: 4
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
    beginPosition: 2017-05-11
    endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450

extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: COD
      attributeType:
    descriptor: ABI L2+ Cloud Optical Depth at 640 nm
    units:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: DQF
      attributeType:
    descriptor: ABI L2+ Cloud Optical Depth data quality flags
    units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image
observation period; Number of good or degraded cloud optical depth pixels for both day and
night; Percentage of daytime, nighttime, and twilight pixels in the product image (solar zenith

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angles 0 to 65, 90 to 180, and 65 to 90 degrees, respectively); Number of cloud optical depth pixels whose values are outside the required measurement range for both the daytime (1 to 50) and nighttime (1 to 8) algorithms; Minimum, maximum, mean, and standard deviation of the cloud optical depth values in the product image for both the daytime and nighttime algorithms. The daytime and nighttime statistics are calculated using pixels to a daytime solar zenith angle of 82 degrees, except for the percent day, night, and twilight statistics that are based on more restrictive day, night, and twilight solar zenith angle ranges. Percentage of daytime, nighttime, and twilight pixels in the image are calculated using geolocated pixels. The other statistics are calculated using good and degraded pixels to a local zenith angle of 65 degrees. The statistics for the image are not restricted to the measurement range specified in the performance requirements. The percentages of pixels assigned to each DQF value are also included in the product.

> **result:**
> **report:** (DQ_CompletenessOmission)
> > **nameOfMeasure:** percent_uncorrectable_L0_errors
> > **evaluationMethodDescription:** Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
> > > **result:** (DQ_QuantitativeResult)
> > > > **valueUnit:**
> > > > > **BaseUnit:**
> > > > > > **identifier:** percent
> > > > > > **unitsSystem:**
> > > > **value:**
> > **report:** (DQ_CompletenessOmission)
> > > **nameOfMeasure:** percent_uncorrectable_GRB_errors
> > > **evaluationMethodDescription:** percent data lost due to uncorrectable GRB errors
> > > **result:** (DQ_QuantitativeResult)
> > > > **valueUnit:**
> > > > > **BaseUnit:**
> > > > > > **identifier:** percent
> > > > > > **unitsSystem:**
> > > > **value:**
> > **lineage:** (LI_Lineage)
> > > **processStep:** (LE_ProcessStep)
> > > > **description:** The Cloud Optical Depth and Cloud Particle Size products are generated by the GOES-R ABI Cloud Microphysical and Optical Properties (COMP) ground processing algorithms for daytime and nighttime. The daytime algorithm employs a physical retrieval based on theoretically computed lookup tables while the nighttime retrieval employs the Community Radiative Transfer Model (CRTM) calculations in an iterative physical retrieval that seeks to minimize the difference between the compute TOA brightness temperature and the observations. The algorithm processes the data pixel-by-pixel, choosing to use the daytime or nighttime approach based on the solar zenith angle threshold value of 82 degrees. The two approaches use different criteria to identify candidate cloudy pixels. The daytime algorithm processes pixels that are identified as cloudy or probably cloudy in the intermediate 4-level cloud mask. In addition to the intermediate 4-level cloud mask, the nighttime algorithm processes pixels based on the intermediate cloud type product data that is generated by the Cloud Type algorithm. The nighttime processing occurs for any pixel that is identified as cloudy, probably cloudy, or

probably clear in the intermediate 4-level cloud mask. However, because the nighttime retrieval requires cloud top temperature product data as input, which is generated only for cloudy, and probably cloud pixels, the nighttime cloud optical depth and particle size are flagged as invalid for pixels identified anywhere the cloud top temperature is invalid. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. The daytime algorithm is limited to local zenith angles below a threshold of 65 degrees. The nighttime algorithm produces degraded quality product data beyond the local zenith angle limit. However, because of the dependency on cloud top temperature, a valid product is restricted to the local zenith angle range for the Cloud Top Temperature product of 70 degrees. The product is generated for all solar zenith angles but is flagged as degraded in the twilight region where the solar zenith angle is between 65 and 82 degrees for the daytime algorithm, and between 82 and 90 degrees for the nighttime algorithm. The Cloud Optical and Microphysical Properties algorithm operates on 2 km pixels, generating an intermediate product at this resolution, but the delivered Cloud Optical Depth product is aggregated to 4 km for the Full Disk coverage region.

        processor: (CI_ResponsibleParty)

          organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

          role: (CI_RoleCode) processor

       output: (LE_Source)

        processedLevel: (MD_Identifier)

         authority: (CI_Citation)

          title: NOAA Processing Levels

          date: (CI_Date)

            date: 2013-11

            dateType: (CI_DateTypeCode) revision

          citedResponsibleParty: (CI_ResponsibleParty)

          organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

            contactInfo: (CI_Contact)

              onlineResource: (CI_OnlineResource)

                linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

              role: (CI_RoleCode) publisher

         code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)

    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)

    operation: (MI_Operation)

      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the

GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/abi.html

date:
code: GOES-16 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov
date:
code: GOES-West (G17)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
identifier: (MD_Identifier)
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description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16

different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.8   Cloud Particle Size Distribution Product ISO Series Metadata

 (MI_Metadata)
   fileIdentifier: 964f0910-afe1-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Cloud Particle Size Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-CPS-ISO-SERIES_c20171311132000.xml

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   spatialRepresentationInfo: (MD_Georectified)
     numberOfDimensions: 2
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) row

      dimensionSize: 5424
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
        Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1500
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 2500
      resolution:
        Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 500
      resolution:
        Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 500
      resolution:
        Distance: 2
    cellGeometry: (MD_CellGeometryCode) area

transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
      code: goes_projection
      codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Cloud Particle Size Product
    alternateTitle: Data short name (DSN): ABI-L2-CPSM1-M3
    alternateTitle: Data short name (DSN): ABI-L2-CPSM2-M3
    alternateTitle: Data short name (DSN): ABI-L2-CPSC-M3
    alternateTitle: Data short name (DSN): ABI-L2-CPSC-M4
    alternateTitle: Data short name (DSN): ABI-L2-CPSF-M3
    alternateTitle: Data short name (DSN): ABI-L2-CPSF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) publication
      code: ABI-L2-CPS*
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)
  address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The Cloud Particle Size product contains an image with pixel values identifying a measure of the effective radius of the particles in a single cloud layer. It is defined by the ratio of the third and second moment of the particle size distribution. Separate algorithms are used for daytime, solar zenith angle to 82 degrees, and nighttime, solar zenith angle greater than 82 degrees, conditions. The product is generated in combination with the Cloud Optical Depth product by the same algorithms. The product includes data quality information that identifies whether the daytime or nighttime algorithm generated the pixel, and provides an assessment of the cloud particle size data values for on-earth pixels. The units of measure for the cloud particle size value is microns. Product data is produced under the following conditions for the daytime algorithm: Cloudy; Geolocated source data to local zenith angles of 65 degrees and to solar zenith angles of 82 degrees. Product data generated by the nighttime algorithm is produced under the following conditions: Cloudy; Geolocated source data to local zenith angles of 70 degrees and solar zenith angles between 82 and 180 degrees. The cloud particle size values reported range from 0 to 100 um. However, the size range depends on day/night conditions and the liquid/ice water phase. Cloud Particle Size product data is identified as degraded in the terminator region, which is a solar zenith angle between 65 and 82 degrees for the daytime algorithm, and 82 and 90 degrees for the nighttime algorithm. The measurement range for Cloud Particle Size is determined by the model parameterization used in the algorithm retrieval. For daytime retrievals, the effective radius is determined by the lookup table bounds, 100.4 to 102.0, corresponding to 2.51 to 100 um, for both liquid and ice clouds. For nighttime retrievals, the effective radiance is determined by the range of particle size models considered: 2 to 32 um for water clouds, and; 2.62 to 78.15 um for ice clouds where the retrieval of particle size diameter is related to the effective radius by a quadratic equation.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4

descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > CLOUDS > DROPLET CONCENTRATION/SIZE
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
  keyword: effective_radius_of_cloud_condensed_water_particles_at_cloud_top
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)

Product Definition and User's Guide (PUG)
Appendix X
01 June 2020   DCN 7035538, Revision J.1

geographicElement: (EX_GeographicDescription)
  geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: 141.7005
  eastBoundLongitude: -55.7005
  southBoundLatitude: -81.3282
  northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Mesoscale

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contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: PSD
     attributeType:
    descriptor: ABI L2+ Cloud Particle Size
    units:
     DerivedUnit:
      identifier: um
      derivationUnitTerm:
    scaleFactor:

offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) qualityInformation
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Cloud Particle Size data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of good or degraded cloud particle size pixels for both day and night; Percentage of daytime, nighttime, and twilight pixels in the product image (solar zenith angles 0 to 65, 90 to 180, and 65 to 90 degrees, respectively); Number of cloud particle size pixels whose values are outside the required measurement range for both the daytime and nighttime algorithms (liquid: 2 to 32 um; ice 2 to 50 um); Minimum, maximum, mean, and standard deviation of the cloud particle size values in the product image for both the daytime and nighttime algorithms. The daytime and nighttime statistics are calculated using pixels to a daytime solar zenith angle of 82 degrees, except for the percent day, night, and twilight statistics that are based on more restrictive day, night, and twilight solar zenith angle ranges. Percentage of daytime, nighttime, and twilight pixels in the image are calculated using geolocated pixels. The other statistics are calculated using good and degraded pixels to a local zenith angle of 65 degrees. The statistics for the image are not restricted to the measurement range specified in the performance requirements. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
     value:

    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_GRB_errors
      evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
      result: (DQ_QuantitativeResult)
        valueUnit:
         BaseUnit:
          identifier: percent
          unitsSystem:
        value:
   lineage: (LI_Lineage)
     processStep: (LE_ProcessStep)
       description: The Cloud Optical Depth and Cloud Particle Size products are generated by the GOES-R ABI Cloud Microphysical and Optical Properties (COMP) ground processing algorithms for daytime and nighttime. The daytime algorithm employs a physical retrieval based on theoretically computed lookup tables while the nighttime retrieval employs the Community Radiative Transfer Model (CRTM) calculations in an iterative physical retrieval that seeks to minimize the difference between the compute TOA brightness temperature and the observations. The algorithm processes the data pixel-by-pixel, choosing to use the daytime or nighttime approach based on the solar zenith angle threshold value of 82 degrees. The two approaches use different criteria to identify candidate cloudy pixels. The daytime algorithm processes pixels that are identified as cloudy or probably cloudy in the intermediate 4-level cloud mask. In addition to the intermediate 4-level cloud mask, the nighttime algorithm processes pixels based on the intermediate cloud type product data that is generated by the Cloud Type algorithm. The nighttime processing occurs for any pixel that is identified as cloudy, probably cloudy, or probably clear in the intermediate 4-level cloud mask. However, because the nighttime retrieval requires cloud top temperature product data as input, which is generated only for cloudy, and probably cloud pixels, the nighttime cloud optical depth and particle size are flagged as invalid for pixels identified anywhere the cloud top temperature is invalid. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. The daytime algorithm is limited to local zenith angles below a threshold of 65 degrees. The nighttime algorithm produces degraded quality product data beyond the local zenith angle limit. However, because of the dependency on cloud top temperature, a valid product is restricted to the local zenith angle range for the Cloud Top Temperature product of 70 degrees. The product is generated for all solar zenith angles but is flagged as degraded in the twilight region where the solar zenith angle is between 65 and 82 degrees for the daytime algorithm, and between 82 and 90 degrees for the nighttime algorithm. The Cloud Optical and Microphysical Properties algorithm operates on 2 km pixels, generating an intermediate product at this resolution, but the delivered Cloud Optical Depth product is aggregated to 4 km for the Full Disk coverage region.
        processor: (CI_ResponsibleParty)
         organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
         role: (CI_RoleCode) processor
       output: (LE_Source)
        processedLevel: (MD_Identifier)
         authority: (CI_Citation)
          title: NOAA Processing Levels
          date: (CI_Date)

date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
role: (CI_RoleCode) publisher
code: L2

---

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
operation: (MI_Operation)
description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://science.nasa.gov/missions/goes-r/
date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)

identifier: (MD_Identifier)
   authority: (CI_Citation)
     title: http://www.goes-r.gov
     date:
   code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov/spacesegment/abi.html
      date:
    code: GOES-16 ABI instrument_id (serial number)
   type: Advanced Baseline Imager
   description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
   identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov/spacesegment/abi.html
date:
code: GOES-17 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.9   Aerosol Detection Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 258cad90-af4b-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Aerosol Detection Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-ADP-ISO-SERIES_c20171311129000.xml

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
       Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
       Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for

geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

        code: goes_projection
        codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Aerosol Detection Product
      alternateTitle: Data short name (DSN): ABI-L2-ADPM1-M3
      alternateTitle: Data short name (DSN): ABI-L2-ADPM2-M3
      alternateTitle: Data short name (DSN): ABI-L2-ADPC-M3
      alternateTitle: Data short name (DSN): ABI-L2-ADPC-M4
      alternateTitle: Data short name (DSN): ABI-L2-ADPF-M3
      alternateTitle: Data short name (DSN): ABI-L2-ADPF-M4
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: ABI-L2-ADP*
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
    abstract: The Aerosol Detection product contains three images in the form of binary masks that identify the presence of aerosols, dust, and smoke. The aerosol mask indicates the presence of either smoke or dust. The dust and smoke masks indicate the presence of dust and smoke, respectively. Because the presence of smoke and dust are independently derived, a given pixel can be identified with both dust and smoke. The product includes data quality information for on-earth pixels. The binary aerosol, dust, and smoke mask values are dimensionless quantities. The

Aerosol Detection product images are produced on the ABI fixed grid at 2 km resolution for Full Disk, CONUS and Mesoscale coverage regions. Product data is produced under the following conditions: Clear sky; Snow-free; Geolocated source data to local zenith angles of 90 degrees and to solar zenith angles of 87 degrees.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

        address: (CI_Address)

          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

          city: Silver Spring

          administrativeArea: MD

          postalCode: 20910

          country: USA

          electronicMailAddress: GOES-R@noaa.gov

        role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

      name: netCDF

      version: 4

    descriptiveKeywords: (MD_Keywords)

      keyword: ATMOSPHERE > AEROSOLS > DUST/ASH/SMOKE

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

        date: (CI_Date)

          date: 2012-10

          dateType: (CI_DateTypeCode) revision

        edition: Version 7.0.0.0.0

        citedResponsibleParty: (CI_ResponsibleParty)

          individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

          role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

      keyword: aerosol_binary_mask

      keyword: smoke_binary_mask

      keyword: dust_binary_mask

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: CF Standard Name Table v25

        date: (CI_Date)

          date: 2013-07-05

          dateType: (CI_DateTypeCode) revision

    resourceConstraints: (MD_SecurityConstraints)

      useLimitation: Unrestricted.

      classification: (MD_ClassificationCode) unclassified

    spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 175.623576
   eastBoundLongitude: -89.623576
   southBoundLatitude: 14.571340
   northBoundLatitude: 53.500062

    extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
        geographicIdentifier: (MD_Identifier)
          code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: aerosol_binary_mask
      attributeType:
    descriptor: Flag to signal the absence/presence of aerosols in each pixel
    units:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: smoke_binary_mask
      attributeType:
    descriptor: Flag to signal the absence/presence of smoke in each pixel
    units:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: dust_binary_mask
      attributeType:
    descriptor: Flag to signal the absence/presence of dust in each pixel
    units:

                NON-Export Controlled Information

scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Aerosol Detection data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Number of pixels where geolocated source data is available to a local zenith angle of 60 degrees; Number of pixels where geolocated source data is available to a solar zenith angle of 60 degrees; Number of pixels that qualified for the smoke and dust retrievals; Number of pixels where each of smoke and dust are detected. Of the number of pixel statistics, the first in the list is calculated using geolocated pixels to a solar zenith angle of 87 degrees. The second statistic in the list is calculated using geolocated pixels to a local zenith angle of 90 degrees. The last two statistics in the list are calculated using good retrieved detection pixels to a local zenith angle of 90 degrees and a solar zenith angle of 87 degrees. The percentages of pixels assigned to each retrieval quality value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)

          valueUnit:
           BaseUnit:
            identifier: percent
            unitsSystem:
          value:
      lineage: (LI_Lineage)
        processStep: (LE_ProcessStep)
          description: The Aerosol Detection product is generated by the GOES-R ABI Aerosol Detection ground processing algorithm. The algorithm applies threshold tests to ABI reflectance bands and thermal bands over land and ocean backgrounds to obtain results. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Snow-free is determined using snow-free pixels indicated in the most recent intermediate binary snow mask generated by the Snow Cover algorithm.
          processor: (CI_ResponsibleParty)
           organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
           role: (CI_RoleCode) processor
         output: (LE_Source)
          processedLevel: (MD_Identifier)
           authority: (CI_Citation)
            title: NOAA Processing Levels
            date: (CI_Date)
             date: 2013-11
             dateType: (CI_DateTypeCode) revision
            citedResponsibleParty: (CI_ResponsibleParty)
            organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
             contactInfo: (CI_Contact)
              onlineResource: (CI_OnlineResource)
               linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
              role: (CI_RoleCode) publisher
          code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the

GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

>**identifier:** (MD_Identifier)
>> **authority:** (CI_Citation)
>>> **title:** http://science.nasa.gov/missions/goes-r/
>>> **date:**
>> **code:**
>
>**status:** (MD_ProgressCode) onGoing
>**parentOperation:**
>**platform:** (MI_Platform)
>> **identifier:** (MD_Identifier)
>>> **authority:** (CI_Citation)
>>>> **title:** http://www.goes-r.gov
>>>> **date:**
>>> **code:** GOES-East (G16)

>**description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

>> **instrument:** (MI_Instrument)
>>> **identifier:** (MD_Identifier)
>>>> **authority:** (CI_Citation)
>>>>> **title:** http://www.goes-r.gov/spacesegment/abi.html

date:
    code: GOES-16 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% ($1\,\sigma$) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K ($1\,\sigma$) at 300K.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov
          date:
        code: GOES-West (G17)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-17 ABI instrument_id (serial number)
    type: Advanced Baseline Imager
    description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16

different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.10 Aerosol Optical Depth Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 6aae4020-af4e-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Aerosol Optical Depth Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-AOD-ISO-SERIES_c20171311130000.xml

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)

dimensionName: (MD_DimensionNameTypeCode) row
dimensionSize: 5424
resolution:
  Distance: 2
axisDimensionProperties: (MD_Dimension)
dimensionName: (MD_DimensionNameTypeCode) column
dimensionSize: 5424
resolution:
  Distance: 2
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
numberOfDimensions: 2
axisDimensionProperties: (MD_Dimension)
  dimensionName: (MD_DimensionNameTypeCode) row
  dimensionSize: 1500
  resolution:
    Distance: 2
axisDimensionProperties: (MD_Dimension)
  dimensionName: (MD_DimensionNameTypeCode) column
  dimensionSize: 2500
  resolution:
    Distance: 2
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: CONUS

---

referenceSystemInfo: (MD_ReferenceSystem)
referenceSystemIdentifier: (RS_Identifier)
  authority: (CI_Citation)
    title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
    otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the

same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

    code: goes_projection
    codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Aerosol Optical Depth Product
    alternateTitle: Data short name (DSN): ABI-L2-AODC-M3
    alternateTitle: Data short name (DSN): ABI-L2-AODC-M4
    alternateTitle: Data short name (DSN): ABI-L2-AODF-M3
    alternateTitle: Data short name (DSN): ABI-L2-AODF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-AOD*
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Aerosol Optical Depth product contains an image with pixel values identifying a measure of the extinction due to atmospheric aerosols at a wavelength of 550 nm over land and ocean. The product includes data quality information that provides an assessment of the quality of the algorithm retrievals for on-earth pixels. The aerosol optical depth value is a dimensionless quantity. The Aerosol Optical Depth product image is produced on the ABI fixed grid at 2 km resolution for Full Disk and CONUS coverage regions. Product data is produced under the following conditions: Clear sky; snow-free; Geolocated source data to local zenith angles of 90 degrees, to solar zenith angles of 90 degrees, and sunglint angles greater than 40 degrees when over the ocean.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,

        NON-Export Controlled Information

and Information Services, NOAA, U.S. Department of Commerce
 contactInfo: (CI_Contact)
  address: (CI_Address)
   deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
   city: Silver Spring
   administrativeArea: MD
   postalCode: 20910
   country: USA
   electronicMailAddress: GOES-R@noaa.gov
 role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
 name: netCDF
 version: 4
descriptiveKeywords: (MD_Keywords)
 keyword: ATMOSPHERE > AEROSOLS > AEROSOL OPTICAL
DEPTH/THICKNESS
 type: (MD_KeywordTypeCode) theme
 thesaurusName: (CI_Citation)
  title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
  date: (CI_Date)
   date: 2012-10
   dateType: (CI_DateTypeCode) revision
  edition: Version 7.0.0.0.0
  citedResponsibleParty: (CI_ResponsibleParty)
   individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
   role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
 keyword: atmosphere_absorption_optical_thickness_due_to_ambient_aerosol
 type: (MD_KeywordTypeCode) theme
 thesaurusName: (CI_Citation)
  title: CF Standard Name Table v25
  date: (CI_Date)
   date: 2013-07-05
   dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
 useLimitation: Unrestricted.
 classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
 distance:
  Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
 temporalElement: (EX_TemporalExtent)

       NON-Export Controlled Information

      extent:
       TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: Full Disk - GOES-East
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: -156.2995
      eastBoundLongitude: 6.2995
      southBoundLatitude: -81.3282
      northBoundLatitude: 81.3282
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: Full Disk - GOES-West
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: 141.7005
      eastBoundLongitude: -55.7005
      southBoundLatitude: -81.3282
      northBoundLatitude: 81.3282
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: CONUS - GOES-East
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: -152.109282
      eastBoundLongitude: -52.946879
      southBoundLatitude: 14.571340
      northBoundLatitude: 56.761450
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: CONUS - GOES-West
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: 175.623576
      eastBoundLongitude: -89.623576
      southBoundLatitude: 14.571340
      northBoundLatitude: 53.500062

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)

sequenceIdentifier:
  MemberName:
    aName: AOD
    attributeType:
descriptor: ABI Level 2+ Aerosol Optical Depth at 550 nm
units:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
  contentType: (MD_CoverageContentTypeCode) qualityInformation
  dimension: (MD_Band)
    sequenceIdentifier:
      MemberName:
        aName: DQF
        attributeType:
    descriptor: ABI Level 2+ Aerosol Optical Depth data quality flags
    units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Percentage of each of good and bad aerosol optical depth pixels over land and over ocean for the eighteen, 10 degree latitude bands in the product image; Number of aerosol optical depth pixels whose values are outside the required measurement range over land and over ocean; Minimum, maximum, mean, and standard deviation of the aerosol optical depth values in the 550 nm image over land and over ocean for the eighteen, 10 degree latitude bands in the product image; Minimum, maximum, mean, and standard deviation of the aerosol optical depth values in the images at ABI reflective band wavelengths associated with source level 1b data used by the algorithm over land and over ocean for the eighteen, 10 degree latitude bands in the product image; Minimum, maximum, mean, and standard deviation of the surface reflectivity values at the ABI reflective band wavelengths associated with source level 1b data used by the algorithm over land and over ocean for the eighteen, 10 degree latitude bands in the product image; Number of attempted retrievals over land and over ocean for the eighteen, 10 degree latitude bands; Number of attempted retrievals over land and over ocean within the local zenith angle performance specification limit of 60 degrees for the eighteen, 10 degree latitude bands. These statistics are calculated using geolocated pixels to a solar zenith angle of 80 degrees, which is associated with good quality pixels. These statistics are calculated using geolocated pixels to a local zenith angle of 90 degrees, except for the number of attempted retrievals over land and over ocean within the local zenith angle performance specification limit of 60 degrees. The percentages of pixels assigned to each retrieval quality value are also included in the product.

---

result:
report: (DQ_CompletenessOmission)
nameOfMeasure: percent_uncorrectable_L0_errors
evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
result: (DQ_QuantitativeResult)
valueUnit:
BaseUnit:
identifier: percent
unitsSystem:
value:
report: (DQ_CompletenessOmission)
nameOfMeasure: percent_uncorrectable_GRB_errors
evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
result: (DQ_QuantitativeResult)
valueUnit:
BaseUnit:
identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The Aerosol Optical Depth product is generated by the GOES-R ABI Aerosol Optical Depth ground processing algorithm. The algorithm determines ABI reflectance measurements using physical retrievals that utilize a lookup table of TOA reflectance that is pre-calculated from the Community Radiative Transfer Model (CRTM). The physical retrievals are performed separately over land and ocean. The algorithm computes the optical thickness of aerosols at wavelengths that depend on the surface type. ABI bands 1, 2, and 6 with central wavelengths of 0.47, 0.64, and 2.25 um are used for land retrievals over dark vegetated surfaces. ABI bands 2, 3, 5, and 6 with central wavelengths of 0.64, 0.87, 1.61, and 2.25 um are used for ocean retrievals. The aerosol type is evaluated based on the selection of an aerosol model from four prescribed land aerosol models, generic, dust, smoke, and urban, or for a pair of fine and coarse marine aerosol modes selected from four prescribed fine modes and five prescribed coarse modes. The suspended matter is derived from the computed aerosol optical depth. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Snow-free is determined using snow-free pixels indicated in the most recent intermediate binary snow mask generated by the Snow Cover algorithm. The latitude band statistics, whose extents are a function of the ABI's fixed grid field of regard and latitude, use the CF metadata conventions hybrid grid mapping that includes both the grid_mapping for the "geostationary" and "latitude_longitude" projections.
processor: (CI_ResponsibleParty)
organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
role: (CI_RoleCode) processor

   output: (LE_Source)
    processedLevel: (MD_Identifier)
     authority: (CI_Citation)
      title: NOAA Processing Levels
      date: (CI_Date)
       date: 2013-11
       dateType: (CI_DateTypeCode) revision
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
       contactInfo: (CI_Contact)
        onlineResource: (CI_OnlineResource)
         linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
       role: (CI_RoleCode) publisher
    code: L2

---

 metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

 acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
   description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://science.nasa.gov/missions/goes-r/

date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
     code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.
      instrument: (MI_Instrument)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/abi.html
         date:
        code: GOES-16 ABI instrument_id (serial number)
       type: Advanced Baseline Imager
       description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.
      platform: (MI_Platform)

identifier: (MD_Identifier)
 authority: (CI_Citation)
  title: http://www.goes-r.gov
  date:
 code: GOES-West (G17)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.
 instrument: (MI_Instrument)
  identifier: (MD_Identifier)
   authority: (CI_Citation)
    title: http://www.goes-r.gov/spacesegment/abi.html
    date:
   code: GOES-17 ABI instrument_id (serial number)
  type: Advanced Baseline Imager
  description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.11   Volcanic Ash: Detection and Height Product ISO Series Metadata

(MI_Metadata)
 fileIdentifier: 0c7acd60-b012-11e1-afa6-0800200c9a66

        NON-Export Controlled Information

language: eng
characterSet: (MD_CharacterSetCode) utf8
parentIdentifier: n/a
hierarchyLevel: (MD_ScopeCode) series
hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Volcanic Ash: Detection and Height Product Collection
contact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ABI-L2-VAA-ISO-SERIES_c20171311126000.xml

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 5424
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 5424
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)

title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
date: (CI_Date)
  date: 2014
  dateType: (CI_DateTypeCode) publication
otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
  code: goes_projection
  codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Volcanic Ash: Detection and Height Product
    alternateTitle: Data short name (DSN): ABI-L2-VAAF-M3
    alternateTitle: Data short name (DSN): ABI-L2-VAAF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-VAAF-*
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Volcanic Ash: Detection and Height product contains two images with pixel values identifying volcanic ash cloud height and volcanic ash mass loading. The ash cloud top height is the geopotential height of the ash cloud top. The ash mass loading in the mass of volcanic ash per unit of area. The product includes two types of data quality information. One

type of data quality indicator describes the quality of the volcanic ash detection, providing an assessment of the presence of volcanic ash for on-earth pixels including an indication of good or degraded quality, or invalid pixels, and the confidence in the detection of volcanic ash existing in single and multiple layers. The second type of data quality indicator provides information about the quality and ash characteristics of the retrieval for on-earth pixels, identifying failure conditions, cloud top temperature, cloud emissivity, and absorbed optical depth ratio retrieval quality, and the volcanic ash particle size. The units of measure for the ash cloud top height value is meters. The units of measure for the ash mass loading value is metric tons (tonnes) per square kilometer. The Volcanic Ash: Detection and Height product images are produced on the ABI fixed grid at 2 km resolution for the Full Disk coverage region. Product data is produced for geolocated source data to local zenith angles of 90 degrees for both daytime and nighttime conditions.

pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)
keyword: ATMOSPHERE > AEROSOLS > DUST/ASH/SMOKE
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0
citedResponsibleParty: (CI_ResponsibleParty)
individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
keyword: volcanic_ash_cloud_height
keyword: volcanic_ash_mass
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: CF Standard Name Table v25

      date: (CI_Date)
        date: 2013-07-05
        dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: VAH

      attributeType:
    descriptor: ABI Level 2+ Volcanic Ash: Ash Cloud Height
    units:
     DerivedUnit:
      identifier: m
      derivationUnitTerm:
    scaleFactor:
    offset:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: VAML
      attributeType:
    descriptor: ABI Level 2+ Volcanic Ash: Ash Mass Loading
    units:
     DerivedUnit:
      identifier: t km-2
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: DET_DQF
      attributeType:
    descriptor: ABI Level 2+ Volcanic Ash data detection quality flags
    units:
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: RET_DQF
      attributeType:
    descriptor: ABI L2+ Volcanic Ash data retrieval quality flags
    units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset

report: (DQ_QuantitativeAttributeAccuracy)

    nameOfMeasure: Product summary statistics

    evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of attempted retrievals; Total volcanic ash mass loading in image; Number of volcanic ash cloud top height and volcanic ash mass loading pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the values in the volcanic ash cloud top height and volcanic ash mass loading product images. Number of attempted retrievals is calculated using geolocated pixels where the retrieval is successful or failed. The other statistics are calculated using geolocated pixels where the retrieval is successful to a local zenith angle of 80 degrees. The percentages of pixels assigned to each flag value for the data detection and retrieval quality information are also included in the product.

    result:

report: (DQ_CompletenessOmission)

    nameOfMeasure: percent_uncorrectable_L0_errors

    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

    result: (DQ_QuantitativeResult)

      valueUnit:

       BaseUnit:

        identifier: percent

        unitsSystem:

      value:

report: (DQ_CompletenessOmission)

    nameOfMeasure: percent_uncorrectable_GRB_errors

    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors

    result: (DQ_QuantitativeResult)

      valueUnit:

       BaseUnit:

        identifier: percent

        unitsSystem:

      value:

lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

      description: The Volcanic Ash: Detection and Height product is generated by the GOES-R ABI Volcanic Ash: Detection and Height ground processing algorithm. Volcanic ash cloud top height and mass loading are determined by retrieving ash cloud effective temperature, 11 micron cloud emissivity, and the 12/11 micron effective absorption optical depth ratio (β-ratio). The algorithm uses a physical retrieval utilizing an in-line radiative transfer model to compute clear sky TOA radiances, clear sky transmittance and radiance profiles, and black cloud radiance profiles. The algorithm is optimized by first detecting volcanic ash, and then performing the volcanic ash cloud top height and mass loading retrievals satisfying an ash confidence level threshold. The algorithm identifies volcanic ash confidence levels for both single and multiple layer cloud conditions. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range.

      processor: (CI_ResponsibleParty)

       organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility,

Suitland, MD)

        role: (CI_RoleCode) processor
      output: (LE_Source)
       processedLevel: (MD_Identifier)
        authority: (CI_Citation)
         title: NOAA Processing Levels
         date: (CI_Date)
          date: 2013-11
          dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric
Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
         role: (CI_RoleCode) publisher
       code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)

         NON-Export Controlled Information

authority: (CI_Citation)
   title: http://science.nasa.gov/missions/goes-r/
   date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: http://www.goes-r.gov
     date:
    code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
       identifier: (MD_Identifier)
        authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/abi.html
         date:
        code: GOES-16 ABI instrument_id (serial number)
       type: Advanced Baseline Imager
       description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared

wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

   platform: (MI_Platform)
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
     code: GOES-West (G17)
    description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
     identifier: (MD_Identifier)
      authority: (CI_Citation)
       title: http://www.goes-r.gov/spacesegment/abi.html
       date:
      code: GOES-17 ABI instrument_id (serial number)
     type: Advanced Baseline Imager
     description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.12   Legacy Vertical Temperature Profile Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 52291390-afe9-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Legacy Vertical Temperature Profile Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-LVTP-ISO-SERIES_c20171311302000.xml

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1086
      resolution:
       Distance: 10
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 1086
      resolution:
       Distance: 10
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

NON-Export Controlled Information

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 300
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 100
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 100
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+
Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products

are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

      code: goes_projection
      codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Legacy Vertical Temperature Profile Product
    alternateTitle: Data short name (DSN): ABI-L2-LVTPM1-M3
    alternateTitle: Data short name (DSN): ABI-L2-LVTPM2-M3
    alternateTitle: Data short name (DSN): ABI-L2-LVTPC-M3
    alternateTitle: Data short name (DSN): ABI-L2-LVTPC-M4
    alternateTitle: Data short name (DSN): ABI-L2-LVTPF-M3
    alternateTitle: Data short name (DSN): ABI-L2-LVTPF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-LVTP*
    citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Legacy Vertical Temperature Profile product contains a three-dimensional image with pixel values identifying the air temperature at 101 standard pressure levels. The units of measure for the temperature profile is Kelvin. The product includes three types of data quality information. One describes the overall quality of the data pixels, providing an assessment of the derived stability indices data values for on-earth pixels. The second provides information about

the quality of the physical retrieval for on-earth pixels, identifying failure conditions. The third provides information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels. The Legacy Vertical Temperature Profile product images are produced on the ABI fixed grid at 10 km resolution for Full Disk, CONUS, and Mesoscale coverage regions. Product data is produced under the following conditions: Clear sky; Geolocated source data to local zenith angles of 80 degrees for both daytime and nighttime conditions.

pointOfContact: (CI_ResponsibleParty)

organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)

address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

city: Silver Spring

administrativeArea: MD

postalCode: 20910

country: USA

electronicMailAddress: GOES-R@noaa.gov

role: (CI_RoleCode) originator

resourceFormat: (MD_Format)

name: netCDF

version: 4

descriptiveKeywords: (MD_Keywords)

keyword: ATMOSPHERE > ATMOSPHERIC TEMPERATURE > TEMPERATURE PROFILES

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

date: (CI_Date)

date: 2012-10

dateType: (CI_DateTypeCode) revision

edition: Version 7.0.0.0.0

citedResponsibleParty: (CI_ResponsibleParty)

individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

role: (CI_RoleCode) author

descriptiveKeywords: (MD_Keywords)

keyword: air_temperature

type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)

title: CF Standard Name Table v25

date: (CI_Date)

date: 2013-07-05

dateType: (CI_DateTypeCode) revision

resourceConstraints: (MD_SecurityConstraints)

useLimitation: Unrestricted

classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 10
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 175.623576

eastBoundLongitude: -89.623576
southBoundLatitude: 14.571340
northBoundLatitude: 53.500062
extent: (EX_Extent)
geographicElement: (EX_GeographicDescription)
geographicIdentifier: (MD_Identifier)
code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) physicalMeasurement
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: LVT
attributeType:
descriptor: ABI Level 2+ Legacy Vertical Temperature Profile provides air temperature at 101 pressure levels in the atmosphere
units:
DerivedUnit:
identifier: K
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) thematicClassification
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: DQF_Overall
attributeType:
descriptor: overall quality of the data pixels, providing an assessment of the vertical temperature profile data values for on-earth pixels
units:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) thematicClassification
dimension: (MD_Band)

sequenceIdentifier:
  MemberName:
    aName: DQF_Retrieval
    attributeType:
descriptor: information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions
  units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF_SkinTemp
     attributeType:
  descriptor: information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) series
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of attempted retrievals; Number of legacy vertical temperature profile data values outside the required measurement range. Note that the count is constrained to no more than one per horizontal grid point; Applicable ABI emissive band-specific brightness temperature differences mean and standard deviation values between those observed and modeled. These statistics are calculated using valid pixels based on the local zenith angle threshold of 80 degrees and the latitude threshold of 70 degrees north and south. The percentages of pixels assigned to each flag value for the three types of data quality information are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent

unitsSystem:
value:
report: (DQ_CompletenessOmission)
nameOfMeasure: percent_uncorrectable_GRB_errors
evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
result: (DQ_QuantitativeResult)
valueUnit:
BaseUnit:
identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The Legacy Vertical Temperature Profile, Legacy Vertical Moisture Profile, Total Precipitable Water, and Derived Stability Indices products are generated by the GOES-R ABI Legacy Atmospheric Profiles ground processing algorithm. The algorithm uses processed NWP model profile data as the first guess and employs a regression retrieval followed by an iterative physical retrieval that utilizes the ground system implementation of the Community Radiative Transfer Model (CRTM) to derive the final product data. The temperature and moisture profiles contain values at 101 standard pressure levels, of which only 54 temperature and 35 moisture pressure levels are actually populated in the retrieval. The 54 temperature levels are from approximately 103 hPa to approximately 1014 hPa. The 35 moisture levels are from 300 hPa to approximately 1014 hPa. The regression retrieval is applied for coverage regions corresponding to local zenith angles to 80 degrees but the physical retrieval is limited to local zenith angles to 67 degrees. The product is generated for 5 x 5 fields of regard from 2 km pixel inputs where the percentage of clear pixels satisfies a 20 percent threshold. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Total precipitable water from the surface to 300 hPa is derived from the retrieved moisture profile. In addition, the five atmospheric stability indices, CAPE, K-index, Lifted Index, Showalter Index, and Total Totals Index, are derived from the retrieved moisture and temperature profiles. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range.
processor: (CI_ResponsibleParty)
organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
role: (CI_RoleCode) processor
output: (LE_Source)
processedLevel: (MD_Identifier)
authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)

> **onlineResource:** (CI_OnlineResource)
> > **linkage:** https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc essing_Levels
> > **role:** (CI_RoleCode) publisher
> **code:** L2

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metadataMaintenance: (MD_MaintenanceInformation)
 maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
 maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
 operation: (MI_Operation)
  description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
   identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: http://science.nasa.gov/missions/goes-r/
     date:
    code:
   status: (MD_ProgressCode) onGoing
   parentOperation:
   platform: (MI_Platform)
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
     code: GOES-East (G16)
    description: The GOES-R System acquires and disseminates environmental data from

---

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov/spacesegment/abi.html
         date:
      code: GOES-16 ABI instrument_id (serial number)
   type: Advanced Baseline Imager
   description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
   identifier: (MD_Identifier)
      authority: (CI_Citation)
         title: http://www.goes-r.gov
         date:
      code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer.

Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov/spacesegment/abi.html
      date:
     code: GOES-17 ABI instrument_id (serial number)
   type: Advanced Baseline Imager
   description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.13   Legacy Vertical Moisture Profile Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: d5ed67b0-afe6-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Legacy Vertical Moisture Profile Product Collection
  contact: (CI_ResponsibleParty)
   organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
   contactInfo: (CI_Contact)
    address: (CI_Address)

deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ABI-L2-LVMP-ISO-SERIES_c20171311302000.xml

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1086
    resolution:
     Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 1086
    resolution:
     Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 300
    resolution:
     Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
     Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true

checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
numberOfDimensions: 2
axisDimensionProperties: (MD_Dimension)
dimensionName: (MD_DimensionNameTypeCode) row
dimensionSize: 100
resolution:
  Distance: 10
axisDimensionProperties: (MD_Dimension)
dimensionName: (MD_DimensionNameTypeCode) column
dimensionSize: 100
resolution:
  Distance: 10
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
referenceSystemIdentifier: (RS_Identifier)
authority: (CI_Citation)
title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+
Products
date: (CI_Date)
  date: 2014
  dateType: (CI_DateTypeCode) publication
otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for
geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized
location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from
a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the
same location on the earth. All of the dynamics associated with an orbiting satellite are removed
to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized
geostationary position.
code: goes_projection
codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
citation: (CI_Citation)
title: ABI Level 2+ Legacy Vertical Moisture Profile Product

---

alternateTitle: Data short name (DSN): ABI-L2-LVMPM1-M3
alternateTitle: Data short name (DSN): ABI-L2-LVMPM2-M3
alternateTitle: Data short name (DSN): ABI-L2-LVMPC-M3
alternateTitle: Data short name (DSN): ABI-L2-LVMPC-M4
alternateTitle: Data short name (DSN): ABI-L2-LVMPF-M3
alternateTitle: Data short name (DSN): ABI-L2-LVMPF-M4
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L2-LVMP*
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The Legacy Vertical Moisture Profile product contains a three-dimensional image with pixel values identifying the water vapor at 101 standard pressure levels. The product includes three types of data quality information. One describes the overall quality of the data pixels, providing an assessment of the legacy vertical temperature profile data values for on-earth pixels. The second provides information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions. The third provides information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels. The units of measure for the vertical temperature value is percent. The Legacy Vertical Moisture Profile product image is generated on the ABI fixed grid at 10 km resolution for Full Disk, CONUS, and Mesoscale coverage regions. Product data is produced under the following conditions: Clear sky; Geolocated source data to local zenith angles of 80 degrees for both daytime and nighttime conditions.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring

administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)
keyword: ATMOSPHERE > ATMOSPHERIC WATER VAPOR > WATER VAPOR PROFILES
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0
citedResponsibleParty: (CI_ResponsibleParty)
individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
keyword: relative_humidity
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: CF Standard Name Table v25
date: (CI_Date)
date: 2013-07-05
dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
useLimitation: Unrestricted
classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
distance:
Distance: 10
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
temporalElement: (EX_TemporalExtent)
extent:
TimePeriod:
beginPosition: 2017-05-11
endPosition: now

extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)

      sequenceIdentifier:
       MemberName:
        aName: LVM
        attributeType:
      descriptor: ABI Level 2+ Legacy Vertical Moisture Profile provides relative humidity at 101 pressure levels in the atmosphere
      units:
       DerivedUnit:
        identifier: percent
        derivationUnitTerm:
      scaleFactor:
      offset:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) thematicClassification
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: DQF_Overall
        attributeType:
      descriptor: overall quality of the data pixels, providing an assessment of the vertical moisture profile data values for on-earth pixels
      units:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) thematicClassification
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: DQF_Retrieval
        attributeType:
      descriptor: information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions
      units:

---

  contentInfo: (MI_CoverageDescription)
    attributeDescription:
     RecordType: variable
    contentType: (MD_CoverageContentTypeCode) thematicClassification
    dimension: (MD_Band)

         NON-Export Controlled Information

sequenceIdentifier:
  MemberName:
    aName: DQF_SkinTemp
    attributeType:
  descriptor: information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels
  units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: mean difference and standard deviation of calculated vs observed brightness temperature by channel; percent of pixels for each data quality flag value
    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: The Legacy Vertical Temperature Profile, Legacy Vertical Moisture Profile, Total Precipitable Water, and Derived Stability Indices products are generated by the GOES-R ABI Legacy Atmospheric Profiles ground processing algorithm. The algorithm uses processed NWP model profile data as the first guess and employs a regression retrieval followed by an iterative physical retrieval that utilizes the ground system implementation of the Community Radiative Transfer Model (CRTM) to derive the final product data. The temperature and moisture profiles contain values at 101 standard pressure levels, of which only 54 temperature and 35 moisture pressure levels are actually populated in the retrieval. The 54

temperature levels are from approximately 103 hPa to approximately 1014 hPa. The 35 moisture levels are from 300 hPa to approximately 1014 hPa. The regression retrieval is applied for coverage regions corresponding to local zenith angles to 80 degrees but the physical retrieval is limited to local zenith angles to 67 degrees. The product is generated for 5 x 5 fields of regard from 2 km pixel inputs where the percentage of clear pixels satisfies a 20 percent threshold. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Total precipitable water from the surface to 300 hPa is derived from the retrieved moisture profile. In addition, the five atmospheric stability indices, CAPE, K-index, Lifted Index, Showalter Index, and Total Totals Index, are derived from the retrieved moisture and temperature profiles. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range.

      processor: (CI_ResponsibleParty)

        organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

        role: (CI_RoleCode) processor

      output: (LE_Source)

       processedLevel: (MD_Identifier)

        authority: (CI_Citation)

         title: NOAA Processing Levels

         date: (CI_Date)

          date: 2013-11

          dateType: (CI_DateTypeCode) revision

         citedResponsibleParty: (CI_ResponsibleParty)

         organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

         contactInfo: (CI_Contact)

          onlineResource: (CI_OnlineResource)

           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

         role: (CI_RoleCode) publisher

       code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)

   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

   maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)

   operation: (MI_Operation)

    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and

lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

     identifier: (MD_Identifier)
      authority: (CI_Citation)
       title: http://science.nasa.gov/missions/goes-r/
       date:
      code:
     status: (MD_ProgressCode) onGoing
     parentOperation:
     platform: (MI_Platform)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:
       code: GOES-East (G16)
     description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

     instrument: (MI_Instrument)
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/abi.html
        date:
       code: GOES-16 ABI instrument_id (serial number)
      type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > **date:**
> > > **code:** GOES-17 ABI instrument_id (serial number)
> > **type:** Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of

storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.14   Total Precipitable Water Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: 42511480-afef-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Total Precipitable Water Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-TPW-ISO-SERIES_c20171311303000.xml

   spatialRepresentationInfo: (MD_Georectified)
     numberOfDimensions: 2
     axisDimensionProperties: (MD_Dimension)
       dimensionName: (MD_DimensionNameTypeCode) row
       dimensionSize: 1086

resolution:
  Distance: 10
axisDimensionProperties: (MD_Dimension)
  dimensionName: (MD_DimensionNameTypeCode) column
  dimensionSize: 1086
  resolution:
    Distance: 10
cellGeometry: (MD_CellGeometryCode) area
transformationParameterAvailability: true
checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 300
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 100
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 100
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true

checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
referenceSystemIdentifier: (RS_Identifier)
authority: (CI_Citation)
title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+
Products
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) publication
otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
code: goes_projection
codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
citation: (CI_Citation)
title: ABI Level 2+ Total Precipitable Water Product
alternateTitle: Data short name (DSN): ABI-L2-TPWM1-M3
alternateTitle: Data short name (DSN): ABI-L2-TPWM2-M3
alternateTitle: Data short name (DSN): ABI-L2-TPWC-M3
alternateTitle: Data short name (DSN): ABI-L2-TPWC-M4
alternateTitle: Data short name (DSN): ABI-L2-TPWF-M3
alternateTitle: Data short name (DSN): ABI-L2-TPWF-M4
date: (CI_Date)
date: 2017-05-11
dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
authority: (CI_Citation)
title: gov.nesdis.noaa
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) revision
code: ABI-L2-TPW*
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)
  address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The Total Precipitable Water product contains an image with pixel values identifying the integrated column water vapor amount from the surface to a height corresponding to an atmospheric pressure of 300 hPa. The units of measure for the total precipitable water value is millimeters. The product includes three types of data quality information. One describes the overall quality of the data pixels, providing an assessment of the derived stability indices data values for on-earth pixels. The second provides information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions. The third provides information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels. The Total Precipitable Water product images are produced on the ABI fixed grid at 10 km resolution for Full Disk, CONUS, and Mesoscale coverage regions. Product data is produced under the following conditions: Clear sky; Geolocated source data to local zenith angles of 80 degrees for both daytime and nighttime conditions.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > ATMOSPHERIC WATER VAPOR > PRECIPITABLE WATER
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)

individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
  keyword: lwe_thickness_of_atmosphere_mass_content_of_water_vapor
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 10
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)

NON-Export Controlled Information

geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 175.623576
   eastBoundLongitude: -89.623576
   southBoundLatitude: 14.571340
   northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
     code: Mesoscale

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contentInfo: (MI_CoverageDescription)
 attributeDescription:
  RecordType: variable
 contentType: (MD_CoverageContentTypeCode) physicalMeasurement
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: TPW
    attributeType:
  descriptor: Total Precipitable Water
  units:
   DerivedUnit:
    identifier: mm
    derivationUnitTerm:
    derivationUnitTerm:
  scaleFactor:
  offset:

---

contentInfo: (MI_CoverageDescription)
 attributeDescription:
  RecordType: variable
 contentType: (MD_CoverageContentTypeCode) thematicClassification
 dimension: (MD_Band)

sequenceIdentifier:
  MemberName:
   aName: DQF_Overall
   attributeType:
  descriptor: overall quality of the data pixels, providing an assessment of the total precipitable water data values for on-earth pixels
   units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF_Retrieval
     attributeType:
  descriptor: information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions
   units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF_SkinTemp
     attributeType:
  descriptor: information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of attempted retrievals; Number of total precipitable water pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the total precipitable water values in the product image; Applicable ABI emissive band-specific brightness temperature differences mean and standard deviation values

between those observed and modeled. These statistics are calculated using valid pixels based on the local zenith angle threshold of 80 degrees and the latitude threshold of 70 degrees north and south. The percentages of pixels assigned to each flag value for the three types of data quality information are also included in the product.

    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: The Legacy Vertical Temperature Profile, Legacy Vertical Moisture Profile, Total Precipitable Water, and Derived Stability Indices products are generated by the GOES-R ABI Legacy Atmospheric Profiles ground processing algorithm. The algorithm uses processed NWP model profile data as the first guess and employs a regression retrieval followed by an iterative physical retrieval that utilizes the ground system implementation of the Community Radiative Transfer Model (CRTM) to derive the final product data. The temperature and moisture profiles contain values at 101 standard pressure levels, of which only 54 temperature and 35 moisture pressure levels are actually populated in the retrieval. The 54 temperature levels are from approximately 103 hPa to approximately 1014 hPa. The 35 moisture levels are from 300 hPa to approximately 1014 hPa. The regression retrieval is applied for coverage regions corresponding to local zenith angles to 80 degrees but the physical retrieval is limited to local zenith angles to 67 degrees. The product is generated for 5 x 5 fields of regard from 2 km pixel inputs where the percentage of clear pixels satisfies a 20 percent threshold. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Total precipitable water from the surface to 300 hPa is derived from the retrieved moisture profile. In addition, the five atmospheric stability indices, CAPE, K-index, Lifted Index, Showalter Index, and Total Totals Index, are derived from the retrieved moisture and temperature profiles. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range.
      processor: (CI_ResponsibleParty)

organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

role: (CI_RoleCode) processor

output: (LE_Source)

processedLevel: (MD_Identifier)

authority: (CI_Citation)

title: NOAA Processing Levels

date: (CI_Date)

date: 2013-11

dateType: (CI_DateTypeCode) revision

citedResponsibleParty: (CI_ResponsibleParty)

organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

contactInfo: (CI_Contact)

onlineResource: (CI_OnlineResource)

linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

role: (CI_RoleCode) publisher

code: L2

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metadataMaintenance: (MD_MaintenanceInformation)

maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)

operation: (MI_Operation)

description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: http://science.nasa.gov/missions/goes-r/
    date:
  code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

  instrument: (MI_Instrument)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/abi.html
        date:
      code: GOES-16 ABI instrument_id (serial number)
    type: Advanced Baseline Imager

    description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60

seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)

> > **description:** The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> > **instrument:** (MI_Instrument)
> > > **identifier:** (MD_Identifier)
> > > > **authority:** (CI_Citation)
> > > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > > **date:**
> > > > **code:** GOES-17 ABI instrument_id (serial number)
> > > **type:** Advanced Baseline Imager

> > > **description:** The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.15   Derived Stability Indices Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: 158fae30-affd-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Derived Stability Indices
Product Collection
   contact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
         address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-DSI-ISO-SERIES_c20171311302000.xml

---

   spatialRepresentationInfo: (MD_Georectified)
      numberOfDimensions: 2
      axisDimensionProperties: (MD_Dimension)
         dimensionName: (MD_DimensionNameTypeCode) row
         dimensionSize: 1086
         resolution:
            Distance: 10
      axisDimensionProperties: (MD_Dimension)
         dimensionName: (MD_DimensionNameTypeCode) column
         dimensionSize: 1086
         resolution:
            Distance: 10
      cellGeometry: (MD_CellGeometryCode) area
      transformationParameterAvailability: true
      checkPointAvailability: false
      pointInPixel: (MD_PixelOrientationCode) upperLeft
      transformationDimensionDescription: Full Disk

NON-Export Controlled Information

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 300
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 100
    resolution:
      Distance: 10
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 100
    resolution:
      Distance: 10
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: GOES-R Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products

are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

   code: goes_projection
   codeSpace: http://cfconventions.org/latest.html

---

 identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
   title: ABI Level 2+ Derived Stability Indices Product
   alternateTitle: Data short name (DSN): ABI-L2-DSIM1-M3
   alternateTitle: Data short name (DSN): ABI-L2-DSIM2-M3
   alternateTitle: Data short name (DSN): ABI-L2-DSIC-M3
   alternateTitle: Data short name (DSN): ABI-L2-DSIC-M4
   alternateTitle: Data short name (DSN): ABI-L2-DSIF-M3
   alternateTitle: Data short name (DSN): ABI-L2-DSIF-M4
   date: (CI_Date)
    date: 2017-05-11
    dateType: (CI_DateTypeCode) creation
   identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: gov.nesdis.noaa
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
    code: ABI-L2-DSI*
   citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
     address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
    role: (CI_RoleCode) originator
  abstract: The Derived Stability Indices product contains images for five stability indices with pixel values that are indicators of atmospheric instability associated with convection and potential thunderstorm activity. 1) Convective(ly) Available Potential Energy (CAPE): A measure of atmospheric stability calculated by integrating the positive temperature difference between the surrounding atmosphere and a parcel of air lifted adiabatically from the surface to its

equilibrium level. It exists under conditions of potential instability, and measures the potential energy per unit mass that would be released by the unstable parcel if it were able to convect upwards to equilibrium. Units of measure are joules per kilogram. 2) Lifted Index: The temperature difference between a parcel of air lifted adiabatically from the surface to a finishing air pressure of 500 hPa in the troposphere and the ambient air temperature at the finishing air pressure in the troposphere. The air parcel is "lifted" by moving the air parcel from the surface to the Lifting Condensation Level (dry adiabatically) and then from the Lifting Condensation Level to the finishing air pressure (wet adiabatically). Units of measure are kelvin. 3) K-Index: A measure of atmospheric stability indicating the potential of severe convection. The index is the difference in air temperature between 850 and 500 hPa, the dew point temperature at 850 hPa, and the difference between the air temperature and the dew point temperature at 700 hPa. Units of measure are kelvin. 4) Showalter Index: A measure of atmospheric stability indicating the convective and thunderstorm potential. The index is the temperature difference between a parcel of air lifted from 850 to 500 hPa (wet adiabatically) and the ambient air temperature at 500 hPa. Units of measure are kelvin. 5) Total Totals Index: A measure of atmospheric stability indicating the likelihood of severe convection. The index is derived from the difference in air temperature between 850 and 500 hPa (the vertical totals) and the difference between the dew point temperature at 850 hPa and the air temperature at 500 hPa (the cross totals). The index is the sum of the vertical and cross totals. Units of measure are kelvin. The product includes three types of data quality information. One describes the overall quality of the data pixels, providing an assessment of the derived stability indices data values for on-earth pixels. The second provides information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions. The third provides information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels. The Derived Stability Indices product images are produced on the ABI fixed grid at 10 km resolution for Full Disk, CONUS, and Mesoscale coverage regions. Product data is produced under the following conditions: Clear sky; Geolocated source data to local zenith angles of 80 degrees for both daytime and nighttime conditions.

    pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
    resourceFormat: (MD_Format)
      name: netCDF
      version: 4
    descriptiveKeywords: (MD_Keywords)
      keyword: ATMOSPHERE > ATMOSPHERIC TEMPERATURE > ATMOSPHERIC STABILITY
      type: (MD_KeywordTypeCode) theme

thesaurusName: (CI_Citation)
   title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
   date: (CI_Date)
     date: 2012-10
     dateType: (CI_DateTypeCode) revision
   edition: Version 7.0.0.0.0
   citedResponsibleParty: (CI_ResponsibleParty)
     individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
   keyword: temperature_difference_between_ambient_air_and_air_lifted_adiabatically_from_the_surface
   keyword: atmosphere_convective_available_potential_energy_wrt_surface
   keyword: atmosphere_stability_k_index
   keyword: atmosphere_stability_showalter_index
   keyword: atmosphere_stability_total_totals_index
   type: (MD_KeywordTypeCode) theme
   thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
     date: 2013-07-05
     dateType: (CI_DateTypeCode) revision
  resourceConstraints: (MD_SecurityConstraints)
   useLimitation: Unrestricted
   classification: (MD_ClassificationCode) unclassified
  spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
  spatialResolution: (MD_Resolution)
   distance:
    Distance: 10
  language: eng; USA
  characterSet: (MD_CharacterSetCode) utf8
  topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
  extent: (EX_Extent)
   temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
  extent: (EX_Extent)
   geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-East
   geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995

      southBoundLatitude: -81.3282
      northBoundLatitude: 81.3282
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: Full Disk - GOES-West
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: 141.7005
      eastBoundLongitude: -55.7005
      southBoundLatitude: -81.3282
      northBoundLatitude: 81.3282
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: CONUS - GOES-East
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: -152.109282
      eastBoundLongitude: -52.946879
      southBoundLatitude: 14.571340
      northBoundLatitude: 56.761450
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: CONUS - GOES-West
     geographicElement: (EX_GeographicBoundingBox)
      westBoundLongitude: 175.623576
      eastBoundLongitude: -89.623576
      southBoundLatitude: 14.571340
      northBoundLatitude: 53.500062
    extent: (EX_Extent)
     geographicElement: (EX_GeographicDescription)
      geographicIdentifier: (MD_Identifier)
       code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: LI
     attributeType:
   descriptor: Derived Stability Indices: Lifted Index
   units:
    DerivedUnit:

      identifier: K
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: CAPE
      attributeType:
    descriptor: ABI Level 2+ Derived Stability Indices: CAPE (Convective(ly) Available Potential Energy)
    units:
     DerivedUnit:
      identifier: J kg-1
      derivationUnitTerm:
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: TT
      attributeType:
    descriptor: ABI Level 2+ Derived Stability Indices: Total Totals Index
    units:
     DerivedUnit:
      identifier: K
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:

    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: SI
       attributeType:
     descriptor: ABI Level 2+ Derived Stability Indices: Showalter Index
     units:
      DerivedUnit:
       identifier: K
       derivationUnitTerm:
     scaleFactor:
     offset:

---

  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) physicalMeasurement
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: KI
       attributeType:
     descriptor: ABI Level 2+ Derived Stability Indices: K-Index
     units:
      DerivedUnit:
       identifier: K
       derivationUnitTerm:
     scaleFactor:
     offset:

---

  contentInfo: (MI_CoverageDescription)
   attributeDescription:
    RecordType: variable
   contentType: (MD_CoverageContentTypeCode) thematicClassification
   dimension: (MD_Band)
     sequenceIdentifier:
      MemberName:
       aName: DQF_Overall
       attributeType:
     descriptor: overall quality of the data pixels, providing an assessment of the derived stability indices data values for on-earth pixels
     units:

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF_Retrieval
     attributeType:
  descriptor: information about the quality of the physical retrieval for on-earth pixels, identifying failure conditions
   units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF_SkinTemp
     attributeType:
  descriptor: information about the quality of the first guess skin temperature for on-earth pixels, identifying temperature threshold failure conditions for on-earth pixels
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of attempted retrievals; Number of CAPE, Lifted Index, K-Index, Showalter Index, and Total Totals Index pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the values in the CAPE, Lifted Index, K-Index, Showalter Index, and Total Totals Index product images; Applicable ABI emissive band-specific brightness temperature differences mean and standard deviation values between those observed and modeled. These statistics are calculated using valid pixels based on the local zenith angle threshold of 80 degrees and the latitude threshold of 70 degrees north and south. The percentages of pixels assigned to each flag value for the three types of data quality information are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors

      NON-Export Controlled Information

evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

    report: (DQ_CompletenessOmission)

      nameOfMeasure: percent_uncorrectable_GRB_errors

      evaluationMethodDescription: percent data lost due to uncorrectable GRB errors

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

  lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

    description: The Legacy Vertical Temperature Profile, Legacy Vertical Moisture Profile, Total Precipitable Water, and Derived Stability Indices products are generated by the GOES-R ABI Legacy Atmospheric Profiles ground processing algorithm. The algorithm uses processed NWP model profile data as the first guess and employs a regression retrieval followed by an iterative physical retrieval that utilizes the ground system implementation of the Community Radiative Transfer Model (CRTM) to derive the final product data. The temperature and moisture profiles contain values at 101 standard pressure levels, of which only 54 temperature and 35 moisture pressure levels are actually populated in the retrieval. The 54 temperature levels are from approximately 103 hPa to approximately 1014 hPa. The 35 moisture levels are from 300 hPa to approximately 1014 hPa. The regression retrieval is applied for coverage regions corresponding to local zenith angles to 80 degrees but the physical retrieval is limited to local zenith angles to 67 degrees. The product is generated for 5 x 5 fields of regard from 2 km pixel inputs where the percentage of clear pixels satisfies a 20 percent threshold. Clear sky is determined using clear and probably clear pixels indicated in the temporally coincident intermediate 4-level cloud mask generated by the Cloud Mask algorithm. Total precipitable water from the surface to 300 hPa is derived from the retrieved moisture profile. In addition, the five atmospheric stability indices, CAPE, K-index, Lifted Index, Showalter Index, and Total Totals Index, are derived from the retrieved moisture and temperature profiles. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range.

      processor: (CI_ResponsibleParty)

        organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

        role: (CI_RoleCode) processor

    output: (LE_Source)

      processedLevel: (MD_Identifier)

        authority: (CI_Citation)

          title: NOAA Processing Levels

      NON-Export Controlled Information

        date: (CI_Date)
         date: 2013-11
         dateType: (CI_DateTypeCode) revision
       citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
         role: (CI_RoleCode) publisher
     code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
     description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
       authority: (CI_Citation)
        title: http://science.nasa.gov/missions/goes-r/
        date:
       code:
      status: (MD_ProgressCode) onGoing
      parentOperation:

        NON-Export Controlled Information

platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-16 ABI instrument_id (serial number)
      type: Advanced Baseline Imager
      description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

  platform: (MI_Platform)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:

      NON-Export Controlled Information

        code: GOES-West (G17)

        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)

        identifier: (MD_Identifier)

        authority: (CI_Citation)

        title: http://www.goes-r.gov/spacesegment/abi.html

        date:

        code: GOES-17 ABI instrument_id (serial number)

        type: Advanced Baseline Imager

        description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.16 Rainfall Rate (Quantitative Precipitation Estimate) Product ISO Series Metadata

(MI_Metadata)

    fileIdentifier: 3a3268a0-b006-11e1-afa6-0800200c9a66

    language: eng

    characterSet: (MD_CharacterSetCode) utf8

    parentIdentifier: n/a

    hierarchyLevel: (MD_ScopeCode) series

hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Rainfall Rate (Quantitative Precipitation Estimate) Product Collection
   contact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
         address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-RRQPE-ISO-SERIES_c20171311301000.xml

---

   spatialRepresentationInfo: (MD_Georectified)
      numberOfDimensions: 2
      axisDimensionProperties: (MD_Dimension)
         dimensionName: (MD_DimensionNameTypeCode) row
         dimensionSize: 5424
         resolution:
          Distance: 2
      axisDimensionProperties: (MD_Dimension)
         dimensionName: (MD_DimensionNameTypeCode) column
         dimensionSize: 5424
         resolution:
          Distance: 2
      cellGeometry: (MD_CellGeometryCode) area
      transformationParameterAvailability: true
      checkPointAvailability: false
      pointInPixel: (MD_PixelOrientationCode) upperLeft
      transformationDimensionDescription: Full Disk

---

   referenceSystemInfo: (MD_ReferenceSystem)
      referenceSystemIdentifier: (RS_Identifier)
         authority: (CI_Citation)
            title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
            date: (CI_Date)
               date: 2014
               dateType: (CI_DateTypeCode) publication

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otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.
       code: goes_projection
       codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: Advanced Baseline Imager (ABI) Level 2+ Rainfall Rate (Quantitative Precipitation Estimate) Product
    alternateTitle: Data short name (DSN): ABI-L2-RRQPEF-M3
    alternateTitle: Data short name (DSN): ABI-L2-RRQPEF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-RRQPEF-*
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Rainfall Rate Quantitative Precipitation Estimate (QPE) product contains an image with pixel values identifying the rainfall rate. The product includes data quality information that provides an assessment of the rainfall rate data values for on-earth pixels. The units of measure for the rainfall rate value is millimeters per hour. The Rainfall Rate (QPE) product image is produced on the ABI fixed grid at 2 km resolution for the Full Disk coverage region. Product data is produced for geolocated source data to local zenith angles of 90 degrees for both daytime and nighttime conditions.

        NON-Export Controlled Information

pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
   address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > PRECIPITATION > PRECIPITATION RATE
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
   title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
   date: (CI_Date)
    date: 2012-10
    dateType: (CI_DateTypeCode) revision
   edition: Version 7.0.0.0.0
   citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
  keyword: rainfall_rate
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
   title: CF Standard Name Table v25
   date: (CI_Date)
    date: 2013-07-05
    dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)

     temporalElement: (EX_TemporalExtent)
      extent:
       TimePeriod:
        beginPosition: 2017-05-11
        endPosition: now
  extent: (EX_Extent)
   geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-East
   geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
  extent: (EX_Extent)
   geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-West
   geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: RRQPE
     attributeType:
   descriptor: ABI Level 2+ Rainfall Rate (Quantitative Prediction Estimate)
   units:
    DerivedUnit:
     identifier: mm h-1
     derivationUnitTerm:
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:

      RecordType: variable
    contentType: (MD_CoverageContentTypeCode) thematicClassification
    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: DQF
        attributeType:
      descriptor: ABI Level 2+ Rainfall Rate (Quantitative Prediction Estimate) data quality

flags
      units:

---

  dataQualityInfo: (DQ_DataQuality)
    scope: (DQ_Scope)
      level: (MD_ScopeCode) dataset
    report: (DQ_QuantitativeAttributeAccuracy)
      nameOfMeasure: Product summary statistics
      evaluationMethodDescription: Start, midpoint, and end time of the product image
observation period; Number of pixels where retrieval is successful; Number of pixels with rain;
Total rainfall rate in product image; Number of rainfall rate pixels whose values are outside the
required measurement range; Minimum, maximum, mean, and standard deviation of the rainfall
rate values in the product image. These statistics are calculated using good quality pixels. The
percentages of pixels assigned to each DQF value are also included in the product.
      result:
    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_L0_errors
      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data
Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity
Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
       valueUnit:
        BaseUnit:
         identifier: percent
         unitsSystem:
       value:
    report: (DQ_CompletenessOmission)
      nameOfMeasure: percent_uncorrectable_GRB_errors
      evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
      result: (DQ_QuantitativeResult)
       valueUnit:
        BaseUnit:
         identifier: percent
         unitsSystem:
       value:
    lineage: (LI_Lineage)
      processStep: (LE_ProcessStep)
       description: The Rainfall Rate (QPE) product is generated by the GOES-R ABI

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Rainfall Rate (QPE) ground processing algorithm. Rainfall rate is obtained using a two-step process that involves the detection of pixels where rain is occurring and the retrieval of rainfall rate for those pixels. The algorithm includes eight linear and eight non-linear predictors based on brightness temperatures measured in five emissive ABI bands 8, 10, 11, 14, and 15 with central wavelengths of 6.17, 7.34. 8.44, 11.19, and 12.27 um, respectively. As a result of the spectral range of the ABI instrument not being capable of penetrating optically thick clouds where precipitation is occurring, the algorithm uses retrieval coefficients that are established based on a statistical correlation of the observed cloud top brightness temperatures with rainfall occurrence and rate as detected by sources capable of penetrating optically thick clouds, such as microwave observations. The retrieval coefficients used by the algorithm are managed as Level 2+ processing parameters (i.e. semi-static data) in the ground system.

     processor: (CI_ResponsibleParty)

       organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

       role: (CI_RoleCode) processor

     output: (LE_Source)

      processedLevel: (MD_Identifier)

       authority: (CI_Citation)

        title: NOAA Processing Levels

        date: (CI_Date)

         date: 2013-11

         dateType: (CI_DateTypeCode) revision

        citedResponsibleParty: (CI_ResponsibleParty)

        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

        contactInfo: (CI_Contact)

         onlineResource: (CI_OnlineResource)

          linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

        role: (CI_RoleCode) publisher

      code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)

   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

   maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)

   operation: (MI_Operation)

    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and

lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
      description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

      instrument: (MI_Instrument)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov/spacesegment/abi.html
            date:
          code: GOES-16 ABI instrument_id (serial number)
        type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

       platform: (MI_Platform)
         identifier: (MD_Identifier)
           authority: (CI_Citation)
             title: http://www.goes-r.gov
             date:
           code: GOES-West (G17)

       description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

       instrument: (MI_Instrument)
         identifier: (MD_Identifier)
           authority: (CI_Citation)
             title: http://www.goes-r.gov/spacesegment/abi.html
             date:
           code: GOES-17 ABI instrument_id (serial number)
         type: Advanced Baseline Imager

       description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of

storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.17 Derived Motion Winds Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: aee58cd0-f85-11e1-a21f-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Derived Motion Winds Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-DMW-ISO-SERIES_c20171311305000.xml

   referenceSystemInfo: (MD_ReferenceSystem)
     referenceSystemIdentifier: (RS_Identifier)
       authority: (CI_Citation)
         title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
         date: (CI_Date)
           date: 2014
           dateType: (CI_DateTypeCode) publication

otherCitationDetails: The data points on GOES-R DMW products use the latitude_longitude CF grid mapping. The coordinates for the global latitude/longitude grid are latitude and longitude. In two-dimensional map space, the x-axis is at the equator, and the y-axis is at the prime (Greenwich) meridian. By convention, degrees north and degrees east are used for latitude and longitude, respectively.

       code: latitude_longitude
       codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Derived Motion Winds Product
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C02
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C07
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWVM1-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C09
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C10
    alternateTitle: Data short name (DSN): ABI-L2-DMWM1-M3C14
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C02
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C07
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWVM2-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C09
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C10
    alternateTitle: Data short name (DSN): ABI-L2-DMWM2-M3C14
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C02
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C07
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWVC-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C09
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C10
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M3C14
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C02
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C07
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWVC-M4C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C09
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C10
    alternateTitle: Data short name (DSN): ABI-L2-DMWC-M4C14
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C02
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C07
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWVF-M3C08
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C09
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C10
    alternateTitle: Data short name (DSN): ABI-L2-DMWF-M3C14

       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C02
       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C07
       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C08
       alternateTitle: Data short name (DSN): ABI-L2-DMWVF-M4C08
       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C09
       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C10
       alternateTitle: Data short name (DSN): ABI-L2-DMWF-M4C14
       date: (CI_Date)
         date: 2017-05-11
         dateType: (CI_DateTypeCode) creation
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: gov.nesdis.noaa
           date: (CI_Date)
             date: 2014
             dateType: (CI_DateTypeCode) revision
         code: ABI-L2-DMW*
       citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
         contactInfo: (CI_Contact)
           address: (CI_Address)
             deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
             city: Silver Spring
             administrativeArea: MD
             postalCode: 20910
             country: USA
             electronicMailAddress: goes-r@noaa.gov
         role: (CI_RoleCode) originator
     abstract: The Derived Motion Winds product contains a list of wind vectors identifying their location, wind speed, wind direction, air pressure and temperature, and local zenith angle. The product includes data quality information for each wind vector. The product name includes the word "derived" because the wind vectors are derived by tracking environmental features, specifically clouds and clear sky water vapor over multiple ABI observations. The type of feature tracked varies as a function of the ABI band. Derived Motion Wind product files are generated for the ABI reflective and emissive band that are used to track features. The units of measure for the wind vector quantities are meters per second for wind speed; degrees for wind direction; hectopascals for wind pressure; kelvin for air temperature. Product data is produced for geolocated source data to local zenith angles of 90 degrees. The Derived Motion Winds product is produced using ABI Full Disk, CONUS, and Mesoscale coverage region observations.
      pointOfContact: (CI_ResponsibleParty)
         organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
         contactInfo: (CI_Contact)
           address: (CI_Address)
             deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
             city: Silver Spring

        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > ATMOSPHERIC WINDS
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
        role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
    keyword: wind_speed
    keyword: wind_from_direction
    keyword: air_pressure
    keyword: air_temperature
    type: (MD_KeywordTypeCode) theme
    thesaurusName: (CI_Citation)
      title: CF Standard Name Table v25
      date: (CI_Date)
        date: 2013-07-05
        dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted.
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) vector
spatialResolution: (MD_Resolution)
  distance:
   Distance: 10
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
     beginPosition: 2017-05-11

        endPosition: now
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: Full Disk - GOES-East
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: -156.2995
       eastBoundLongitude: 6.2995
       southBoundLatitude: -81.3282
       northBoundLatitude: 81.3282
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: Full Disk - GOES-West
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: 141.7005
       eastBoundLongitude: -55.7005
       southBoundLatitude: -81.3282
       northBoundLatitude: 81.3282
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: CONUS - GOES-East
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: -152.109282
       eastBoundLongitude: -52.946879
       southBoundLatitude: 14.571340
       northBoundLatitude: 56.761450
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: CONUS - GOES-West
      geographicElement: (EX_GeographicBoundingBox)
       westBoundLongitude: 175.623576
       eastBoundLongitude: -89.623576
       southBoundLatitude: 14.571340
       northBoundLatitude: 53.500062
     extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
       geographicIdentifier: (MD_Identifier)
        code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement

    dimension: (MD_Band)
      sequenceIdentifier:
       MemberName:
        aName: wind_direction
        attributeType:
      descriptor: wind vectors wind from direction measured positive clockwise from due north
      units:
       DerivedUnit:
        identifier: degree
        derivationUnitTerm:
      scaleFactor:
      offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: wind_speed
      attributeType:
    descriptor: wind vector's wind speed
    units:
     DerivedUnit:
      identifier: m s-1
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: pressure
      attributeType:
    descriptor: wind vector's air pressure
    units:
     DerivedUnit:
      identifier: hPa

derivationUnitTerm:
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
 RecordType: variable
contentType: (MD_CoverageContentTypeCode) physicalMeasurement
dimension: (MD_Band)
 sequenceIdentifier:
  MemberName:
   aName: temperature
   attributeType:
 descriptor: wind vector's air temperature
 units:
  DerivedUnit:
   identifier: k
   derivationUnitTerm:
 scaleFactor:
 offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
 RecordType: variable
contentType: (MD_CoverageContentTypeCode) qualityInformation
dimension: (MD_Band)
 sequenceIdentifier:
  MemberName:
   aName: DQF
   attributeType:
 descriptor: ABI Level 2+ Derived Motion Winds data quality flags
 units:

---

dataQualityInfo: (DQ_DataQuality)
scope: (DQ_Scope)
 level: (MD_ScopeCode) series
report: (DQ_QuantitativeAttributeAccuracy)
 nameOfMeasure: Product summary statistics
 evaluationMethodDescription: Time between successive ABI images used to derive
wind vectors, and ABI band-specific geospatial criteria for finding and tracking features; Start,
midpoint, and end time of the wind vectors in the product, which corresponds to the middle Level
1b product image observation period; Number of vectors' wind speeds whose values are outside
the required measurement range; Minimum, maximum, mean, and standard deviation of the

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vector's wind speed values in the product file; Number of wind vectors in each of three atmospheric layers, and the minimum, maximum, mean, and standard deviation of the constituent wind vectors' cloud top pressure values. These statistics are calculated using good quality wind vectors. The percentages of pixels assigned to each DQF value are also included in the product.

      result:

    report: (DQ_CompletenessOmission)

      nameOfMeasure: percent_uncorrectable_L0_errors

      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

    report: (DQ_CompletenessOmission)

      nameOfMeasure: percent_uncorrectable_GRB_errors

      evaluationMethodDescription: percent data lost due to uncorrectable GRB errors

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

   lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

      description: The Derived Motion Winds product is generated by the GOES-R ABI Derived Motion Winds ground processing algorithm. Wind speed and direction are determined by tracking environmental features, specifically cloud edges and clear sky moisture gradients, over a time series composed of three ABI observations. Two displacement vectors are produced for the two time adjacent observation pairs, and then averaged. The time associated with wind vectors in a Derived Motion Winds product file is the acquisition time associated with the middle observation. The algorithm performs several consistency checks on the derived wind information including a comparison with the NWP wind forecast to establish a confidence level for the wind vector and an estimate of its wind speed error. For each ABI band, algorithm processing occurs independently and separate product files are generated. The configuration of each retrieval is band dependent and is determined by the target type (clear sky water vapor or cloud), target box size, search window size (i.e. lag size), temporal spacing between image pairs, and the application of nested tracking of target sub-regions. This configuration information is included in the product metadata. Product files include data for each attempted wind retrieval. It is possible that one or more wind vectors in a product file have one or more null values in its data elements, which is indicated with the applicable variables' fill values. When operating in ABI mode 3, there will be a delay in the production of mesoscale Derived Motion Wind product files when the ABI is commanded to observe a new mesoscale region. This is because the algorithm requires three successive product images. The amount of delay is approximately twice the required time between successive images, which is band-specific and managed as a parameter in the Level 2+

    NON-Export Controlled Information

semi-static source data. The time between successive images value is included in the product.

        processor: (CI_ResponsibleParty)

          organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

          role: (CI_RoleCode) processor

       output: (LE_Source)

        processedLevel: (MD_Identifier)

         authority: (CI_Citation)

          title: NOAA Processing Levels

          date: (CI_Date)

           date: 2013-11

           dateType: (CI_DateTypeCode) revision

          citedResponsibleParty: (CI_ResponsibleParty)

          organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)

           contactInfo: (CI_Contact)

            onlineResource: (CI_OnlineResource)

             linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels

            role: (CI_RoleCode) publisher

         code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)

    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)

    operation: (MI_Operation)

      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit

storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/abi.html
              date:
            code: GOES-16 ABI instrument_id (serial number)
          type: Advanced Baseline Imager
          description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5

minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
       title: http://www.goes-r.gov
       date:
     code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
       title: http://www.goes-r.gov/spacesegment/abi.html
       date:
     code: GOES-17 ABI instrument_id (serial number)
   type: Advanced Baseline Imager
   description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.18   Hurricane Intensity Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: a70be540-c38b-11e0-962b-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Hurricane Intensity Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-HIE-ISO-SERIES_c20171311301000.xml

---

  referenceSystemInfo: (MD_ReferenceSystem)
    referenceSystemIdentifier: (RS_Identifier)
      authority: (CI_Citation)
        title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) publication
        otherCitationDetails: The data points on GOES-R HIE products use the latitude_longitude CF grid mapping. The coordinates for the global latitude/longitude grid are latitude and longitude. In two-dimensional map space, the x-axis is at the equator, and the y-axis is at the prime (Greenwich) meridian. By convention, degrees north and degrees east are used for latitude and longitude, respectively.
      code: latitude_longitude
      codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Hurricane Intensity Product
      alternateTitle: Data short name (DSN): ABI-L2-HIEF-M3

alternateTitle: Data short name (DSN): ABI-L2-HIEF-M4
date: (CI_Date)
  date: 2017-05-11
  dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
  authority: (CI_Citation)
    title: gov.nesdis.noaa
    date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
  code: ABI-L2-HIEF-*
citedResponsibleParty: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: goes-r@noaa.gov
  role: (CI_RoleCode) originator
abstract: The Hurricane Intensity product contains information about tropical cyclones along their trajectories from the time they are identified to the current time. Tropical cyclone information provided in the product includes its identity, location, maximum wind speed, Dvorak tropical cyclone current intensity number, detailed wind shear, cloud, and eye characteristics, strengthening and weakening state information, and the start, midpoint, and end observation time of the source ABI product image. Data quality information is not included in the product. A hurricane intensity product file is produced for each tropical cyclone. The units of measure for the maximum sustained wind speed value is meters per second. The advanced Dvorak technique tropical cyclone current and tropical intensity numbers are dimensionless quantities. The Hurricane Intensity product is produced using ABI Full Disk coverage region observations. Product data is produced when a tropical cyclone is in the ABI's field of regard for both daytime and nighttime conditions.
pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
    address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910
      country: USA
      electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator

resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: ATMOSPHERE > ATMOSPHERIC PHENOMENA > HURRICANES
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
    date: (CI_Date)
      date: 2012-10
      dateType: (CI_DateTypeCode) revision
    edition: Version 7.0.0.0.0
    citedResponsibleParty: (CI_ResponsibleParty)
      individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
      role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
    keyword: dvorak_tropical_cyclone_current_intensity_number
    keyword: tropical_cyclone_maximum_sustained_wind_speed
    keyword: dvorak_tropical_number
    type: (MD_KeywordTypeCode) theme
    thesaurusName: (CI_Citation)
      title: CF Standard Name Table v27
      date: (CI_Date)
        date: 2013-11
        dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) vector
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
      TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)

        westBoundLongitude: -156.2995
        eastBoundLongitude: 6.2995
        southBoundLatitude: -81.3282
        northBoundLatitude: 81.3282
    extent: (EX_Extent)
      geographicElement: (EX_GeographicDescription)
        geographicIdentifier: (MD_Identifier)
          code: Full Disk - GOES-West
      geographicElement: (EX_GeographicBoundingBox)
        westBoundLongitude: 141.7005
        eastBoundLongitude: -55.7005
        southBoundLatitude: -81.3282
        northBoundLatitude: 81.3282

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: wind_speed
      attributeType:
    descriptor: ABI Level 2+ Hurricane Intensity: tropical cyclone's maximum sustained wind speed
    units:
     DerivedUnit:
      identifier: m s-1
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: CI_number
      attributeType:
    descriptor: ABI Level 2+ Hurricane Intensity: advanced Dvorak technique tropical cyclone current intensity number (CI#)
    units:

scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: final_T_number
      attributeType:
    descriptor: ABI Level 2+ Hurricane Intensity: advanced Dvorak technique final tropical number (T#)
      units:
      scaleFactor:
      offset:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) series
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Observation time: J2000 epoch (seconds since 2000-01-01 12:00:00) mid-point between the start and end image scan in seconds associated with tropical cyclone intensity estimate; Observation time bounds: start and end time of each image scan associated with tropical cyclone intensity estimates over time; Cloud temperature annular average: cloud top temperature in cloud region annulus centered at storm center; Eye temperature standard deviation: standard deviation of brightness temperature values in eye region.
    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
    result: (DQ_QuantitativeResult)

      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
    lineage: (LI_Lineage)
      processStep: (LE_ProcessStep)
        description: The Hurricane Intensity product is generated by the GOES-R ABI Hurricane Intensity ground processing algorithm. The algorithm, which is the Advanced Dvorak Technique, is used to derive a set of Dvorak Tropical numbers and a Current Intensity number that map directly to a maximum sustained one minute wind speed using a set of pre-determined statistical relationships. The algorithm determines the intensity of a tropical cyclone by matching observed brightness temperature patterns in the current processed ABI Full Disk level 1b band 13 image with a central wavelength of 10.33 um to a set of pre-defined tropical cyclone structures. From this correlation, the center and scene type of the tropical cyclone are determined. The Tropical and Current Intensity numbers are determined based on the recent trend of strengthening or weakening, and pre-defined intensity variation thresholds that vary as a function of time.

        processor: (CI_ResponsibleParty)
         organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
         role: (CI_RoleCode) processor
       output: (LE_Source)
        processedLevel: (MD_Identifier)
         authority: (CI_Citation)
          title: NOAA Processing Levels
          date: (CI_Date)
           date: 2013-11
           dateType: (CI_DateTypeCode) revision
         citedResponsibleParty: (CI_ResponsibleParty)
         organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
          contactInfo: (CI_Contact)
           onlineResource: (CI_OnlineResource)
            linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
          role: (CI_RoleCode) publisher
        code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)

description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://science.nasa.gov/missions/goes-r/
      date:
    code:
  status: (MD_ProgressCode) onGoing
  parentOperation:
  platform: (MI_Platform)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov
        date:
    code: GOES-East (G16)

  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

  instrument: (MI_Instrument)

identifier: (MD_Identifier)
   authority: (CI_Citation)
     title: http://www.goes-r.gov/spacesegment/abi.html
     date:
   code: GOES-16 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.
   platform: (MI_Platform)
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
     code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.
    instrument: (MI_Instrument)
     identifier: (MD_Identifier)
      authority: (CI_Citation)
       title: http://www.goes-r.gov/spacesegment/abi.html
       date:
      code: GOES-17 ABI instrument_id (serial number)

type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.19 Fire (Hot Spot Characterization) Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: b015d6f0-b002-11e1-afa6-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Fire (Hot Spot Characterization) Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
     contactInfo: (CI_Contact)
       address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
     role: (CI_RoleCode) originator
   dateStamp: 2017-05-11
   metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
   metadataStandardVersion: ISO 19115-2:2009(E)
   dataSetURI: OR_ABI-L2-FDC-ISO-SERIES_c20171311305000.xml

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 5424
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 5424
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for

geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

        code: goes_projection
        codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Fire (Hot Spot Characterization) Product
      alternateTitle: Data short name (DSN): ABI-L2-FDCC-M3
      alternateTitle: Data short name (DSN): ABI-L2-FDCC-M4
      alternateTitle: Data short name (DSN): ABI-L2-FDCF-M3
      alternateTitle: Data short name (DSN): ABI-L2-FDCF-M4
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: ABI-L2-FDC*
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
    abstract: The Fire (HSC) product contains four images, one in the form of a fire mask, and the other three with pixel values identifying fire temperature, fire area, and fire radiative power. Pixel values in the fire mask image identify a fire category and diagnostic information associated with algorithm execution. The six fire categories include: Good quality or temporally filtered good quality fire pixel; Saturated fire pixel or temporally filtered saturated fire pixel; Cloud contaminated or temporally filtered cloud contaminated fire pixel; High probability or temporally filtered high probability fire pixel; Medium probability or temporally filtered high probability fire pixel; Low probability or temporally filtered high probability fire. Temporally filtered fire pixels

are those resulting from fire pixels that are in close proximity in both space and time. The product includes data quality information that provides an assessment of fire detection for on-earth pixels. The units of measure for the Fire (HSC) product quantities are for Mask: dimensionless; for Temperature: kelvin; for Area: square kilometers; for Radiative Power: megawatts. The Fire (HSC) product image is produced on the ABI fixed grid at 2 km resolution for Full Disk and CONUS coverage regions. Product data is produced under the following conditions: Existence of land; Geolocated source data to local zenith angles of 80 degrees, solar zenith angles between 10 and 180 degrees, and sunglint angles greater than 10 degrees.

pointOfContact: (CI_ResponsibleParty)
  organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
  contactInfo: (CI_Contact)
   address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
  name: netCDF
  version: 4
descriptiveKeywords: (MD_Keywords)
  keyword: HUMAN DIMENSIONS > NATURAL HAZARDS > FIRES
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
   title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
   date: (CI_Date)
    date: 2012-10
    dateType: (CI_DateTypeCode) revision
   edition: Version 7.0.0.0.0
   citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
  descriptiveKeywords: (MD_Keywords)
   keyword: fire_area
   keyword: fire_temperature
   keyword: fire_radiative_power
   type: (MD_KeywordTypeCode) theme
   thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
     date: 2013-07-05
     dateType: (CI_DateTypeCode) revision

resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-West

geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: 175.623576
  eastBoundLongitude: -89.623576
  southBoundLatitude: 14.571340
  northBoundLatitude: 53.500062

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: Mask
     attributeType:
   descriptor: ABI Level 2+ Fire (Hot Spot Characterization): Fire Mask
   units:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: Area
     attributeType:
   descriptor: ABI Level 2+ Fire (Hot Spot Characterization): Fire Area
   units:
    DerivedUnit:
     identifier: km2
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:

MemberName:
  aName: Temp
  attributeType:
descriptor: ABI Level 2+ Fire (Hot Spot Characterization): Fire Temperature
units:
  DerivedUnit:
  identifier: K
  derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: Power
     attributeType:
   descriptor: ABI Level 2+ Fire (Hot Spot Characterization): Fire Power
   units:
    DerivedUnit:
     identifier: MW
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Fire (Hot Spot Characterization) data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) series

report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of pixels with fire detected, but fire temperature, area and radiative power not reported; Number of pixels with fire temperature and area reported, but radiative power not reported; Number of pixels with fire temperature, area, and radiative power reported; Number of fire temperature, fire area, and fire radiative power pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the values in the fire temperature, fire area, and fire radiative power product images. The fire pixel count statistics are calculated using good quality fire pixels where the fire mask for these pixels indicate at least medium probability of fire. The fire temperature, fire area, and fire radiative power minimum, maximum, mean and standard deviation statistics are calculated using good quality fire pixels where the fire mask for these pixels indicate definite fire. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
lineage: (LI_Lineage)
   processStep: (LE_ProcessStep)
      description: The Fire product is generated by the GOES-R ABI Land Fire ground processing algorithm. The Fire algorithm is a dynamic multispectral thresholding algorithm that uses the differences in sensitivity to high temperature subpixel anomalies of ABI bands 7 and 14, with central wavelengths of 3.89 and 11.19 um, respectively. The algorithm consists of a series of screening tests, threshold tests, and calculations that are applied to each pixel. Estimates of subpixel fire area, temperature, and power are computed based on a screening. Additionally, subsequent analysis can introduce additional fire pixels in the fire mask for which fire properties are not derived from the source ABI data. Pixels in the product images with out of range values are assigned the minimum or maximum value in the valid range. Reflectance for band 2 and brightness temperature for band 15 are used in cloud tests but are not required to detect fires. The

algorithm maintains "time of last fire" intermediate data for each pixel that is used and updated for each execution of the algorithm.

      processor: (CI_ResponsibleParty)
        organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
        role: (CI_RoleCode) processor
     output: (LE_Source)
      processedLevel: (MD_Identifier)
       authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
          date: 2013-11
          dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
          contactInfo: (CI_Contact)
           onlineResource: (CI_OnlineResource)
            linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
          role: (CI_RoleCode) publisher
        code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis

stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

          instrument: (MI_Instrument)
            identifier: (MD_Identifier)
              authority: (CI_Citation)
                title: http://www.goes-r.gov/spacesegment/abi.html
                date:
              code: GOES-16 ABI instrument_id (serial number)
            type: Advanced Baseline Imager
            description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3

          NON-Export Controlled Information

concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

        platform: (MI_Platform)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov
              date:
            code: GOES-West (G17)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

          instrument: (MI_Instrument)
            identifier: (MD_Identifier)
              authority: (CI_Citation)
                title: http://www.goes-r.gov/spacesegment/abi.html
                date:
              code: GOES-17 ABI instrument_id (serial number)
            type: Advanced Baseline Imager
            description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.20   Land Surface (Skin) Temperature Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: f22c3310-b00a-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Land Surface Temperature
Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and
Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-LST-ISO-SERIES_c20171311306000.xml

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 1086
      resolution:
       Distance: 10
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 1086
      resolution:
       Distance: 10
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

     NON-Export Controlled Information

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
      Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
      Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
      title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
      date: (CI_Date)
        date: 2014
        dateType: (CI_DateTypeCode) publication
      otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for

geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

        code: goes_projection
        codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Land Surface Temperature Product
      alternateTitle: Data short name (DSN): ABI-L2-LSTM1-M3
      alternateTitle: Data short name (DSN): ABI-L2-LSTM2-M3
      alternateTitle: Data short name (DSN): ABI-L2-LSTC-M3
      alternateTitle: Data short name (DSN): ABI-L2-LSTC-M4
      alternateTitle: Data short name (DSN): ABI-L2-LSTF-M3
      alternateTitle: Data short name (DSN): ABI-L2-LSTF-M4
      date: (CI_Date)
        date: 2017-05-11
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: ABI-L2-LST*
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
    abstract: The Land Surface (Skin) Temperature product contains an image with pixel values identifying the instantaneous land surface skin temperature or surface radiometric temperature. Measured from the perspective of the satellite, the product is limited to clear conditions over land and represents the effective land temperature over an isothermal mixed pixel. The product includes data quality information that provides an assessment of the quality of the algorithm retrievals for on-earth pixels. The units of measure for the land surface (skin)

temperature value is kelvin. The Land Surface (Skin) Temperature product image is produced on the ABI fixed grid at 10 km resolution for Full Disk and 2 km resolution for CONUS and Mesoscale coverage regions. Product data is produced under the following conditions: Existence of land; Clear sky; Geolocated source data to local zenith angles of 85 degrees for both daytime and nighttime conditions.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

        address: (CI_Address)

          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

          city: Silver Spring

          administrativeArea: MD

          postalCode: 20910

          country: USA

          electronicMailAddress: GOES-R@noaa.gov

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

      name: netCDF

      version: 4

    descriptiveKeywords: (MD_Keywords)

      keyword: LAND SURFACE > LAND TEMPERATURE > LAND SURFACE TEMPERATURE

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

        date: (CI_Date)

          date: 2012-10

          dateType: (CI_DateTypeCode) revision

        edition: Version 7.0.0.0.0

        citedResponsibleParty: (CI_ResponsibleParty)

          individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

          role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

      keyword: surface_temperature

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: CF Standard Name Table v25

        date: (CI_Date)

          date: 2013-07-05

          dateType: (CI_DateTypeCode) revision

    resourceConstraints: (MD_SecurityConstraints)

      useLimitation: Unrestricted

      classification: (MD_ClassificationCode) unclassified

    spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

spatialResolution: (MD_Resolution)
  distance:
   Distance: 10
spatialResolution: (MD_Resolution)
  distance:
   Distance: 2
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
     beginPosition: 2017-05-11
     endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -152.109282
   eastBoundLongitude: -52.946879
   southBoundLatitude: 14.571340
   northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)

Product Definition and User's Guide (PUG)
Appendix X
01 June 2020   DCN 7035538, Revision J.1

westBoundLongitude: 175.623576
eastBoundLongitude: -89.623576
southBoundLatitude: 14.571340
northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Mesoscale

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: LST
      attributeType:
    descriptor: ABI Level 2+ Land Surface Temperature
    units:
     DerivedUnit:
      identifier: K
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: DQF
      attributeType:
    descriptor: ABI Level 2+ Land Surface Temperature data quality flags
    units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image

observation period; Number of good retrievals; Number of good retrievals where valid land surface (skin) temperature data is determined. Number of land surface (skin) temperature pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the land surface (skin) temperature values in the product image. These statistics are calculated using pixels with good retrievals and a local zenith angle to 85 degrees. The percentages of pixels assigned to each retrieval quality value are also included in the product.

      result:

    report: (DQ_CompletenessOmission)

      nameOfMeasure: percent_uncorrectable_L0_errors

      evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

    report: (DQ_CompletenessOmission)

      nameOfMeasure: percent_uncorrectable_GRB_errors

      evaluationMethodDescription: percent data lost due to uncorrectable GRB errors

      result: (DQ_QuantitativeResult)

        valueUnit:

         BaseUnit:

          identifier: percent

          unitsSystem:

        value:

  lineage: (LI_Lineage)

    processStep: (LE_ProcessStep)

      description: The Land Surface Temperature product is generated by the GOES-R ABI Land Surface Temperature ground processing algorithm. This product is generated using a regression algorithm based on ABI brightness temperatures and brightness temperature differences for ABI window bands 14 and 15 with central wavelengths of 11.19 and 12.27 um, respectively and on Level 2+ processing parameters containing surface emissivity data. The algorithm applies difference regression coefficients for dry or moist atmospheric conditions as determined from the Total Precipitable Water product or the NWP total precipitable water dynamic processed ancillary data. The 10 km resolution Total Precipitable Water product is upscaled to 2 km using nearest neighbor to support the retrieval. The Land Surface Temperature algorithm operates on 2 km resolution pixels and generates products at this resolution for CONUS and Mesoscale coverage regions, and aggregates the retrieved land surface temperatures to 10 km resolution for the Full Disk coverage region.

      processor: (CI_ResponsibleParty)

        organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)

        role: (CI_RoleCode) processor

      output: (LE_Source)

        processedLevel: (MD_Identifier)

      NON-Export Controlled Information

authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)
linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
role: (CI_RoleCode) publisher
code: L2

---

metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
operation: (MI_Operation)
description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://science.nasa.gov/missions/goes-r/
date:
code:

status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-East (G16)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/abi.html
          date:
        code: GOES-16 ABI instrument_id (serial number)
      type: Advanced Baseline Imager

      description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

    platform: (MI_Platform)
      identifier: (MD_Identifier)
        authority: (CI_Citation)

title: http://www.goes-r.gov
date:
code: GOES-West (G17)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.
instrument: (MI_Instrument)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov/spacesegment/abi.html
date:
code: GOES-17 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.21   Snow Cover Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: e7ce8b20-b00a-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Fractional Snow Cover Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2017-05-11
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-FSC-ISO-SERIES_c20171311306000.xml

---

  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 5424
      resolution:
       Distance: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 5424
      resolution:
       Distance: 2
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true
    checkPointAvailability: false
    pointInPixel: (MD_PixelOrientationCode) upperLeft
    transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 1500
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 2500
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 500
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 500
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2 Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products
are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for

geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

>   **code:** goes_projection
>   **codeSpace:** http://cfconventions.org/latest.html

---

   identificationInfo: (MD_DataIdentification)
     citation: (CI_Citation)
       title: ABI Level 2+ Fractional Snow Cover Product
       alternateTitle: Data short name (DSN): ABI-L2-FSCM1-M3
       alternateTitle: Data short name (DSN): ABI-L2-FSCM2-M3
       alternateTitle: Data short name (DSN): ABI-L2-FSCC-M3
       alternateTitle: Data short name (DSN): ABI-L2-FSCC-M4
       alternateTitle: Data short name (DSN): ABI-L2-FSCF-M3
       alternateTitle: Data short name (DSN): ABI-L2-FSCF-M4
       date: (CI_Date)
         date: 2017-05-11
         dateType: (CI_DateTypeCode) creation
       identifier: (MD_Identifier)
         authority: (CI_Citation)
           title: gov.nesdis.noaa
           date: (CI_Date)
             date: 2014
             dateType: (CI_DateTypeCode) revision
         code: ABI-L2-FSC*
       citedResponsibleParty: (CI_ResponsibleParty)
       organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
           contactInfo: (CI_Contact)
             address: (CI_Address)
               deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
               city: Silver Spring
               administrativeArea: MD
               postalCode: 20910
               country: USA
               electronicMailAddress: goes-r@noaa.gov
           role: (CI_RoleCode) originator
     abstract: The Snow Cover product contains an image with pixel values identifying the fraction of their areas covered by snow. The product includes data quality information that provides an assessment of the snow cover data values for on-earth pixels. The units of measure for the snow cover value is percent. The Snow Cover product image is produced on the ABI fixed grid at 2 km resolution for Full Disk, CONUS and Mesoscale coverage regions. Product data is produced under the following conditions: Existence of land; Clear sky; Geolocated source data to

local zenith angles of 90 degrees and solar zenith angles of 90 degrees.

    pointOfContact: (CI_ResponsibleParty)

      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

      contactInfo: (CI_Contact)

        address: (CI_Address)

          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor

          city: Silver Spring

          administrativeArea: MD

          postalCode: 20910

          country: USA

          electronicMailAddress: GOES-R@noaa.gov

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

      name: netCDF

      version: 4

    descriptiveKeywords: (MD_Keywords)

      keyword: CRYOSPHERE > SNOW/ICE > SNOW COVER

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

        date: (CI_Date)

          date: 2012-10

          dateType: (CI_DateTypeCode) revision

        edition: Version 7.0.0.0.0

        citedResponsibleParty: (CI_ResponsibleParty)

          individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

          role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

      keyword: surface_snow_area_fraction

      type: (MD_KeywordTypeCode) theme

      thesaurusName: (CI_Citation)

        title: CF Standard Name Table v25

        date: (CI_Date)

          date: 2013-07-05

          dateType: (CI_DateTypeCode) revision

    resourceConstraints: (MD_SecurityConstraints)

      useLimitation: Unrestricted

      classification: (MD_ClassificationCode) unclassified

    spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid

    spatialResolution: (MD_Resolution)

      distance:

       Distance: 2

    language: eng; USA

    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere

extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -156.2995
    eastBoundLongitude: 6.2995
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 141.7005
    eastBoundLongitude: -55.7005
    southBoundLatitude: -81.3282
    northBoundLatitude: 81.3282
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -152.109282
    eastBoundLongitude: -52.946879
    southBoundLatitude: 14.571340
    northBoundLatitude: 56.761450
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.623576
    eastBoundLongitude: -89.623576
    southBoundLatitude: 14.571340
    northBoundLatitude: 53.500062
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Mesoscale

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: FSC
     attributeType:
   descriptor: ABI Level 2+ Snow Cover, which contains fraction of pixel covered by snow
   units:
    DerivedUnit:
     identifier: percent
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Snow Cover data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of snow cover pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the snow cover values in the product image; Minimum, maximum, mean, and standard deviation of the root mean square difference between the observed surface bidirectional reflectance values in ABI reflective bands 1, 2, 3, 5 and 6 with central wavelengths of 0.47, 0.64, 0.87, 1.61, and 2.25 um, and the corresponding modeled values derived from a multiple endmember mixing model values in the product image. These statistics are calculated using good quality pixels. The percentages of pixels assigned to each DQF value are also included in the product.
   result:

      report: (DQ_CompletenessOmission)
        nameOfMeasure: percent_uncorrectable_L0_errors
        evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
          result: (DQ_QuantitativeResult)
            valueUnit:
             BaseUnit:
               identifier: percent
               unitsSystem:
            value:
     report: (DQ_CompletenessOmission)
       nameOfMeasure: percent_uncorrectable_GRB_errors
       evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
       result: (DQ_QuantitativeResult)
         valueUnit:
          BaseUnit:
            identifier: percent
            unitsSystem:
         value:
   lineage: (LI_Lineage)
     processStep: (LE_ProcessStep)
       description: The Snow Cover product is generated by the GOES-R ABI Snow Cover ground processing algorithm. The algorithm relies on atmospherically-corrected surface reflectances derived as part of the determination of the surface albedo and does not use ABI Level 1b data inputs directly. The product is generated using spectral mixture analysis with a look-up table containing spectral reflectances of individual surfaces calculated from a radiative transfer model, and also a physical retrieval utilizing a spectral library lookup table to account for the dependency of reflectance on snow grain size, and local and solar zenith angles. The algorithm maintains an endmember memory file that contains two values per pixel indicating the endmember identifiers of the last modeled endmembers. Types of endmembers are land surface materials such as snow, vegetation, and rock, and are characterized using unique reflectance spectra based on modeled and field measurements. The endmemory memory file is re-initialized daily.
        processor: (CI_ResponsibleParty)
         organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
          role: (CI_RoleCode) processor
        output: (LE_Source)
         processedLevel: (MD_Identifier)
          authority: (CI_Citation)
            title: NOAA Processing Levels
            date: (CI_Date)
              date: 2013-11
              dateType: (CI_DateTypeCode) revision
            citedResponsibleParty: (CI_ResponsibleParty)
             organisationName: National Oceanographic and atmospheric

Administration (NOAA) National Geophysical Data Center (NGDC)
     contactInfo: (CI_Contact)
      onlineResource: (CI_OnlineResource)
       linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc
essing_Levels
     role: (CI_RoleCode) publisher
   code: L2

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: ISO Series metadata contain quasi-static general information about a
collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
   description: The Geostationary Operational Environmental Satellite-R Series (GOES-R)
is the United States Government geostationary weather satellite series having an operational life-
cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the
GOES-R series result in more timely and accurate forecasts and warnings than previous
generations, including the capability to image its near hemispherical field of view in five minutes.
The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and
lightning detection capability improves support for the detection and observations of
meteorological phenomena that directly affect public safety, protection of property, and
ultimately, economic health and development. The GOES-R series was a collaborative
development and acquisition effort between the National Oceanic and Atmospheric
Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The
GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's
Western Hemisphere and space weather monitoring. It is the primary tool for the detection and
tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of
Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis
stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit
storage. The satellite operates through periodic station-keeping and momentum transfer
maneuvers, which allow for near-continuous instrument observations.
    identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://science.nasa.gov/missions/goes-r/
      date:
     code:
    status: (MD_ProgressCode) onGoing
    parentOperation:
    platform: (MI_Platform)
     identifier: (MD_Identifier)
      authority: (CI_Citation)
       title: http://www.goes-r.gov
       date:

          NON-Export Controlled Information

code: GOES-East (G16)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov/spacesegment/abi.html

date:

code: GOES-16 ABI instrument_id (serial number)

type: Advanced Baseline Imager

description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)

identifier: (MD_Identifier)

authority: (CI_Citation)

title: http://www.goes-r.gov

date:

code: GOES-West (G17)

description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager

(ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

         instrument: (MI_Instrument)
           identifier: (MD_Identifier)
             authority: (CI_Citation)
                title: http://www.goes-r.gov/spacesegment/abi.html
                date:
             code: GOES-17 ABI instrument_id (serial number)
           type: Advanced Baseline Imager
           description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.22   Sea Surface (Skin) Temperature Product ISO Series Metadata

(MI_Metadata)
   fileIdentifier: d70be540-c38a-11e0-962b-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Sea Surface (Skin) Temperature Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce

contactInfo: (CI_Contact)
  address: (CI_Address)
    deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
    city: Silver Spring
    administrativeArea: MD
    postalCode: 20910
    country: USA
    electronicMailAddress: GOES-R@noaa.gov
  role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ABI-L2-SST-ISO-SERIES_c20171311306000.xml

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 5424
    resolution:
     Distance: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 5424
    resolution:
     Distance: 2
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R ABI level 1b and level 2+ products are on the ABI fixed grid. The ABI fixed grid defines the location of each data point to allow for geo-referencing. The ABI fixed grid is a projection that is mathematically based on the idealized location of the GOES-R satellite. The ABI fixed grid allows the data points in every product from a GOES-R satellite at a particular longitude in geostationary orbit generated over time to be at the

  NON-Export Controlled Information

same location on the earth. All of the dynamics associated with an orbiting satellite are removed to accomplish this. The fixed grid is rectified to a GRS80 geoid viewed from the idealized geostationary position.

       code: goes_projection
       codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: Advanced Baseline Imager (ABI) Level 2+ Sea Surface (Skin) Temperature Product
    alternateTitle: Data short name (DSN): ABI-L2-SSTF-M3
    alternateTitle: Data short name (DSN): ABI-L2-SSTF-M4
    date: (CI_Date)
      date: 2017-05-11
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: gov.nesdis.noaa
        date: (CI_Date)
          date: 2014
          dateType: (CI_DateTypeCode) revision
      code: ABI-L2-SSTF-*
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: The Sea Surface (Skin) Temperature product contains an image with pixel values identifying the variations in temperature of the top 10 um of the sea surface. These values are calibrated to the bulk temperature at a depth of 1 m associated with in situ temperature measurements. On average, the pixel values represent the bulk sea surface temperature, but horizontal spatial variations in the product image reveal features associated with the sea surface skin temperature. The product includes data quality information that provides an assessment of the sea surface (skin) temperature data values for on-earth pixels. The units of measure for the sea surface (skin) temperature value is kelvin. The Sea Surface (Skin) Temperature product image is produced on the ABI fixed grid at 2 km resolution for the Full Disk coverage region. Product data is produced under the following conditions: Existence of sea; Geolocated source data to local zenith angles of 90 degrees for both daytime and nighttime conditions.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,

and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
       address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
    resourceFormat: (MD_Format)
     name: netCDF
     version: 4
    descriptiveKeywords: (MD_Keywords)
     keyword: OCEANS > OCEAN TEMPERATURE > SEA SURFACE TEMPERATURE
     type: (MD_KeywordTypeCode) theme
     thesaurusName: (CI_Citation)
      title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
      date: (CI_Date)
       date: 2012-10
       dateType: (CI_DateTypeCode) revision
      edition: Version 7.0.0.0.0
      citedResponsibleParty: (CI_ResponsibleParty)
       individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
       role: (CI_RoleCode) author
    descriptiveKeywords: (MD_Keywords)
     keyword: sea_surface_skin_temperature
     type: (MD_KeywordTypeCode) theme
     thesaurusName: (CI_Citation)
      title: CF Standard Name Table v25
      date: (CI_Date)
       date: 2013-07-05
       dateType: (CI_DateTypeCode) revision
    resourceConstraints: (MD_SecurityConstraints)
     useLimitation: Unrestricted
     classification: (MD_ClassificationCode) unclassified
    spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
    spatialResolution: (MD_Resolution)
     distance:
      Distance: 2
    language: eng; USA
    characterSet: (MD_CharacterSetCode) utf8
    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
    extent: (EX_Extent)
     temporalElement: (EX_TemporalExtent)

  extent:
   TimePeriod:
    beginPosition: 2017-05-11
    endPosition: now
 extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.2995
   eastBoundLongitude: 6.2995
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282
 extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.7005
   eastBoundLongitude: -55.7005
   southBoundLatitude: -81.3282
   northBoundLatitude: 81.3282

---

contentInfo: (MI_CoverageDescription)
 attributeDescription:
  RecordType: variable
 contentType: (MD_CoverageContentTypeCode) physicalMeasurement
 dimension: (MD_Band)
  sequenceIdentifier:
   MemberName:
    aName: SST
    attributeType:
  descriptor: ABI Level 2+ Sea Surface (Skin) Temperature
  units:
   DerivedUnit:
    identifier: K
    derivationUnitTerm:
  scaleFactor:
  offset:

---

contentInfo: (MI_CoverageDescription)
 attributeDescription:
 contentType: (MD_CoverageContentTypeCode) thematicClassification
 dimension: (MD_Band)
  sequenceIdentifier:

      NON-Export Controlled Information

MemberName:
  aName: DQF
  attributeType:
descriptor: ABI Level 2+ Sea Surface (Skin) Temperature data quality flags
units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
    level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
    nameOfMeasure: Product summary statistics
    evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of good quality sea surface (skin) temperature pixels; Number of degraded and severely degraded quality sea surface (skin) temperature pixels; Number of unprocessed on-earth pixels in the sea surface (skin) temperature image; Number of day, night, and twilight sea surface (skin) temperature pixels; Number of sea surface (skin) temperature pixels whose values are outside the required measurement range; Minimum, maximum, mean, and standard deviation of the land surface (skin) temperature values in the product image; Minimum, maximum, mean, and standard deviation of the difference in the observed and modeled brightness temperature for ABI band 7 with central wavelength of 3.89 um used during the nighttime only generation of the sea surface (skin) temperature data; Minimum, maximum, mean, and standard deviation of the difference in the observed and modeled brightness temperature for ABI bands 14 and 15 with central wavelengths of 11.19 and 12.27 um used during the daytime and nighttime generation of the sea surface (skin) temperature data. The number of good quality, day, night, twilight, and outlier statistics are calculated using geolocated sea pixels to a local zenith angle of 67 degrees. The degraded count statistics are calculated using geolocated sea pixels to a local zenith angle of 90 degrees. The sea surface (skin) temperature and brightness temperature difference statistics are calculated using good quality pixels to a local zenith angle of 67 degrees. The percentages of pixels assigned to each DQF value are also included in the product.
      result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
      result: (DQ_QuantitativeResult)
        valueUnit:
          BaseUnit:
            identifier: percent
            unitsSystem:
        value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
      result: (DQ_QuantitativeResult)

valueUnit:
  BaseUnit:
   identifier: percent
   unitsSystem:
  value:
lineage: (LI_Lineage)
  processStep: (LE_ProcessStep)
   description: The Sea Surface (Skin) Temperature product is generated by the GOES-R ABI Sea Surface (Skin) Temperature ground processing algorithm. This product is retrieved using a hybrid regression algorithm that incorporates observed brightness temperatures, clear sky brightness temperatures computed based on the Community Radiative Transfer Model (CRTM), and the Reynolds sea surface temperature. Regression coefficients are defined for daytime and for nighttime conditions. This algorithm can also be configured to execute in a standard regression configuration that does not rely on the CRTM inputs. An attribute of the primary data variable in the product file, "algorithm_type", indicates the specific algorithm used. Both algorithms employ a multiband approach, relying on brightness temperature in ABI bands 7, 14, and 15 with central wavelengths 3.89, 11.19, and 12.27 um for nighttime, and ABI bands 14 and 15 for daytime. Pixels in the product image with out-of-range values are assigned the minimum or maximum value in the valid range. The product is a composite, making use of multiple ABI Full Disk observations collected over a one hour period at fifteen minute intervals. The algorithm applies the hybrid regression for all ocean pixels regardless of cloud cover.
   processor: (CI_ResponsibleParty)
    organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
    role: (CI_RoleCode) processor
  output: (LE_Source)
   processedLevel: (MD_Identifier)
    authority: (CI_Citation)
     title: NOAA Processing Levels
     date: (CI_Date)
      date: 2013-11
      dateType: (CI_DateTypeCode) revision
     citedResponsibleParty: (CI_ResponsibleParty)
     organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
      contactInfo: (CI_Contact)
       onlineResource: (CI_OnlineResource)
        linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
      role: (CI_RoleCode) publisher
    code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: ISO Series metadata contain quasi-static general information about a

collection of datasets of a particular product that changes infrequently

---

acquisitionInformation: (MI_AcquisitionInformation)
  operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
          code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of

distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov/spacesegment/abi.html
      date:
     code: GOES-16 ABI instrument_id (serial number)
   type: Advanced Baseline Imager
   description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
   identifier: (MD_Identifier)
     authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
     code: GOES-West (G17)
   description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

instrument: (MI_Instrument)

identifier: (MD_Identifier)
　authority: (CI_Citation)
　　title: http://www.goes-r.gov/spacesegment/abi.html
　　date:
　code: GOES-17 ABI instrument_id (serial number)
type: Advanced Baseline Imager
description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.23　Downward Shortwave Radiation: Surface Product ISO Series Metadata

(MI_Metadata)
　fileIdentifier: de00d810-b013-11e1-afa6-0800200c9a66
　language: eng
　characterSet: (MD_CharacterSetCode) utf8
　parentIdentifier: n/a
　hierarchyLevel: (MD_ScopeCode) series
　hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Downward Shortwave Radiation: Surface Product Collection
　contact: (CI_ResponsibleParty)
　　organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
　　contactInfo: (CI_Contact)
　　　address: (CI_Address)
　　　　deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
　　　　city: Silver Spring
　　　　administrativeArea: MD
　　　　postalCode: 20910
　　　　country: USA
　　　　electronicMailAddress: GOES-R@noaa.gov
　　role: (CI_RoleCode) originator
　dateStamp: 2014-10-18
　metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data

metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ABI-L2-DSR-ISO-SERIES_c20142911829410.xml

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spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 326
    resolution:
      Distance: 50
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 326
    resolution:
      Distance: 50
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 397
    resolution:
      Distance: 25
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 169
    resolution:
      Distance: 25
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS East

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 380

---

    resolution:
     Distance: 25
  axisDimensionProperties: (MD_Dimension)
   dimensionName: (MD_DimensionNameTypeCode) column
   dimensionSize: 156
   resolution:
    Distance: 25
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS West

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
   dimensionName: (MD_DimensionNameTypeCode) row
   dimensionSize: 565
   resolution:
    Distance: 5
  axisDimensionProperties: (MD_Dimension)
   dimensionName: (MD_DimensionNameTypeCode) column
   dimensionSize: 888
   resolution:
    Distance: 5
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: Mesoscale

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
   authority: (CI_Citation)
    title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
    date: (CI_Date)
     date: 2014
     dateType: (CI_DateTypeCode) publication
    otherCitationDetails: The data points on GOES-R Radiation products use the latitude_longitude CF grid mapping. The coordinates for the global latitude/longitude grid are latitude and longitude. In two-dimensional map space, the x-axis is at the equator, and the y-axis is at the prime (Greenwich) meridian. By convention, degrees north and degrees east are used for latitude and longitude, respectively.
   code: latitude_longitude

      codeSpace: http://cfconventions.org/latest.html

---

  identificationInfo: (MD_DataIdentification)
    citation: (CI_Citation)
      title: ABI Level 2+ Downward Shortwave Radiation: Surface Product
      alternateTitle: Data short name (DSN): ABI-L2-DSRM1-M3
      alternateTitle: Data short name (DSN): ABI-L2-DSRM2-M3
      alternateTitle: Data short name (DSN): ABI-L2-DSRC-M3
      alternateTitle: Data short name (DSN): ABI-L2-DSRC-M4
      alternateTitle: Data short name (DSN): ABI-L2-DSRF-M3
      alternateTitle: Data short name (DSN): ABI-L2-DSRF-M4
      date: (CI_Date)
        date: 2014-10-18
        dateType: (CI_DateTypeCode) creation
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: gov.nesdis.noaa
          date: (CI_Date)
            date: 2014
            dateType: (CI_DateTypeCode) revision
        code: ABI-L2-DSR*
      citedResponsibleParty: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
        contactInfo: (CI_Contact)
          address: (CI_Address)
            deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
            city: Silver Spring
            administrativeArea: MD
            postalCode: 20910
            country: USA
            electronicMailAddress: goes-r@noaa.gov
        role: (CI_RoleCode) originator
    abstract: The Downward Shortwave Radiation: Surface product contains an image with pixel values identifying the instantaneous total shortwave irradiance (flux) received at the Earth's surface integrated over the 0.2 to 4.0 um wavelength bandpass. It includes contributions from direct solar radiation attenuated by the atmosphere and from diffuse radiation associated with scattering within the atmosphere. The product includes data quality information that provides an assessment of the downward shortwave radiation: surface data values for on-earth pixels. The units of measure for the downward shortwave radiation: surface value is watts per square meter. The Downward Shortwave Radiation: Surface product image is produced on a global latitude/longitude grid at 0.5 degree resolution for Full Disk, 0.25 degree resolution for CONUS, and 0.05 degree resolution for Mesoscale coverage regions. Product data is produced for geolocated source data to local zenith angles of 90 degrees and solar zenith angles to 90 degrees.
    pointOfContact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,

      NON-Export Controlled Information

and Information Services, NOAA, U.S. Department of Commerce
       contactInfo: (CI_Contact)
        address: (CI_Address)
         deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
         city: Silver Spring
         administrativeArea: MD
         postalCode: 20910
         country: USA
         electronicMailAddress: GOES-R@noaa.gov
       role: (CI_RoleCode) originator
     resourceFormat: (MD_Format)
      name: netCDF
      version: 4
     descriptiveKeywords: (MD_Keywords)
      keyword: ATMOSPHERE > ATMOSPHERIC RADIATION > SHORTWAVE RADIATION
      type: (MD_KeywordTypeCode) theme
      thesaurusName: (CI_Citation)
       title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
       date: (CI_Date)
        date: 2012-10
        dateType: (CI_DateTypeCode) revision
       edition: Version 7.0.0.0.0
       citedResponsibleParty: (CI_ResponsibleParty)
        individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
        role: (CI_RoleCode) author
     descriptiveKeywords: (MD_Keywords)
      keyword: surface_downwelling_shortwave_flux_in_air
      type: (MD_KeywordTypeCode) theme
      thesaurusName: (CI_Citation)
       title: CF Standard Name Table v25
       date: (CI_Date)
        date: 2013-07-05
        dateType: (CI_DateTypeCode) revision
     resourceConstraints: (MD_SecurityConstraints)
      useLimitation: Unrestricted
      classification: (MD_ClassificationCode) unclassified
     spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
     spatialResolution: (MD_Resolution)
      distance:
       Distance: 50
     spatialResolution: (MD_Resolution)
      distance:
       Distance: 25
     spatialResolution: (MD_Resolution)

distance:
  Distance: 5
language: eng; USA
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2014-10-18
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.50
   eastBoundLongitude: 6.50
   southBoundLatitude: -81.50
   northBoundLatitude: 81.50
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 141.50
   eastBoundLongitude: -55.50
   southBoundLatitude: -81.50
   northBoundLatitude: 81.50
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -151.75
   eastBoundLongitude: -53.25
   southBoundLatitude: 14.25
   northBoundLatitude: 55.75
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
     code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: 175.5
   eastBoundLongitude: -89.5
   southBoundLatitude: 14.25
   northBoundLatitude: 53.5
extent: (EX_Extent)

> **geographicElement:** (EX_GeographicDescription)
> > **geographicIdentifier:** (MD_Identifier)
> > > **code:** Mesoscale

---

contentInfo: (MI_CoverageDescription)
> **attributeDescription:**
> > **RecordType:** variable
>
> **contentType:** (MD_CoverageContentTypeCode) physicalMeasurement
> **dimension:** (MD_Band)
> > **sequenceIdentifier:**
> > > **MemberName:**
> > > > **aName:** DSR
> > > > **attributeType:**
> >
> > **descriptor:** ABI Level 2+ Downward Shortwave Radiation: Surface
> > **units:**
> > > **DerivedUnit:**
> > > > **identifier:** W m-2
> > > > **derivationUnitTerm:**
> > > > **derivationUnitTerm:**
> >
> > **scaleFactor:**
> > **offset:**

---

contentInfo: (MI_CoverageDescription)
> **attributeDescription:**
> > **RecordType:** variable
>
> **contentType:** (MD_CoverageContentTypeCode) thematicClassification
> **dimension:** (MD_Band)
> > **sequenceIdentifier:**
> > > **MemberName:**
> > > > **aName:** DQF
> > > > **attributeType:**
> >
> > **descriptor:** ABI Level 2+ Downward Shortwave Radiation: Surface data quality flags
> > **units:**

---

dataQualityInfo: (DQ_DataQuality)
> **scope:** (DQ_Scope)
> > **level:** (MD_ScopeCode) series
>
> **report:** (DQ_QuantitativeAttributeAccuracy)
> > **nameOfMeasure:** Product summary statistics
> > **evaluationMethodDescription:** Start, midpoint, and end time of the product image
observation period; Number of attempted retrievals; Number of attempted retrievals to local
zenith angle of 70 degrees; Number of downward shortwave radiation: surface pixels whose
values are outside the required measurement range; Cloud fraction in product image; Minimum,
maximum, mean, and standard deviation of the solar zenith angle values for the product image's

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pixels; Minimum, maximum, mean, and standard deviation of the downward shortwave radiation: surface values in the product image. The attempted retrieval count, cloud fraction, and solar zenith angle statistics are calculated using geolocated pixels to a solar zenith angle of 90 degrees. The downward shortwave radiation: surface values in the product image. The attempted retrieval count, cloud fraction, and solar zenith angle statistics are calculated using geolocated pixels to a solar zenith angle of 90 degrees. The downward shortwave radiation: surface outlier count and other statistics are calculated using good quality pixels to a local zenith angle to 70 degrees and solar zenith angle to 70 degrees. The percentages of pixels assigned to each DQF value are also included in the product.

    result:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_L0_errors
    evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  report: (DQ_CompletenessOmission)
    nameOfMeasure: percent_uncorrectable_GRB_errors
    evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
    result: (DQ_QuantitativeResult)
      valueUnit:
       BaseUnit:
        identifier: percent
        unitsSystem:
      value:
  lineage: (LI_Lineage)
    processStep: (LE_ProcessStep)
      description: The Downward Shortwave Radiation: Surface product is generated by the GOES-R ABI Downward Shortwave Radiation: Surface and Reflected Shortwave Radiation: TOA ground processing algorithm. Depending on the availability of inputs, the algorithm performs either a direct or indirect retrieval of broadband transmittance and reflectance over four scene types: clear sky over no snow/ice; clear sky over snow/ice; water cloud, and; ice cloud. The direct retrieval is primary method. Computed atmospheric transmittance and reflectance are used to derive the shortwave fluxes at the surface and TOA. The direct retrieval path uses ABI products to estimate fluxes from Level 2 processing parameter lookup tables whose values are based on a forward radiative transfer model. When inputs needed for the direct retrieval path are not available, the algorithm uses the indirect retrieval path, invoking a multistep inversion scheme. The indirect retrieval path includes the calculation of a clear-sky snow/ice-free composite TOA albedo derived from the ABI reflectance observations over the previous 29 days. Both retrieval paths rely on primary inputs at 2 km resolution that are averaged over each scene type on the output global latitude/longitude grid. Grid cells within the product extent not represented by a direct mapping between the ABI fixed grid and the global latitude/longitude grid are assigned values based on the nearest neighbor. The coverage region included in the Full Disk and CONUS radiation products is the minimum bounding rectangle within the global latitude/longitude grid. In the case of the mesoscale coverage region, the radiation product data

structure dimensions are fixed and based on its maximum latitude/longitude extent on the ABI Full Disk. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range.

    processor: (CI_ResponsibleParty)
      organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
      role: (CI_RoleCode) processor
    output: (LE_Source)
     processedLevel: (MD_Identifier)
      authority: (CI_Citation)
       title: NOAA Processing Levels
       date: (CI_Date)
        date: 2013-11
        dateType: (CI_DateTypeCode) revision
       citedResponsibleParty: (CI_ResponsibleParty)
       organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
        contactInfo: (CI_Contact)
         onlineResource: (CI_OnlineResource)
          linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
       role: (CI_RoleCode) publisher
     code: L2

---

  metadataMaintenance: (MD_MaintenanceInformation)
   maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
   maintenanceNote: ISO Series metadata contain quasi-static general information about a collection of datasets of a particular product that changes infrequently

---

  acquisitionInformation: (MI_AcquisitionInformation)
   operation: (MI_Operation)
    description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of

Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.

      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://science.nasa.gov/missions/goes-r/
          date:
        code:
      status: (MD_ProgressCode) onGoing
      parentOperation:
      platform: (MI_Platform)
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://www.goes-r.gov
            date:
          code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

         instrument: (MI_Instrument)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov/spacesegment/abi.html
              date:
            code: GOES-16 ABI instrument_id (serial number)
          type: Advanced Baseline Imager
          description: The Advanced Baseline Imager is the primary instrument on GOES-16 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk

mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

platform: (MI_Platform)
  identifier: (MD_Identifier)
    authority: (CI_Citation)
      title: http://www.goes-r.gov
      date:
    code: GOES-West (G17)
  description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

  instrument: (MI_Instrument)
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: http://www.goes-r.gov/spacesegment/abi.html
        date:
      code: GOES-17 ABI instrument_id (serial number)
    type: Advanced Baseline Imager
    description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60

seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.24 Reflected Shortwave Radiation: Top-Of-Atmosphere Product ISO Series Metadata

(MI_Metadata)
  fileIdentifier: 02f5ddc0-b008-11e1-afa6-0800200c9a66
  language: eng
  characterSet: (MD_CharacterSetCode) utf8
  parentIdentifier: n/a
  hierarchyLevel: (MD_ScopeCode) series
  hierarchyLevelName: ISO Series Metadata for ABI Level 2+ Reflected Shortwave Radiation: Top-Of-Atmosphere Product Collection
  contact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
      address: (CI_Address)
        deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
        city: Silver Spring
        administrativeArea: MD
        postalCode: 20910
        country: USA
        electronicMailAddress: GOES-R@noaa.gov
    role: (CI_RoleCode) originator
  dateStamp: 2014-10-18
  metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
  metadataStandardVersion: ISO 19115-2:2009(E)
  dataSetURI: OR_ABI-L2-RSR-ISO-SERIES_c20142911843070.xml

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  spatialRepresentationInfo: (MD_Georectified)
    numberOfDimensions: 2
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) row
      dimensionSize: 652
      resolution:
        Distance: 25
    axisDimensionProperties: (MD_Dimension)
      dimensionName: (MD_DimensionNameTypeCode) column
      dimensionSize: 652
      resolution:
        Distance: 25
    cellGeometry: (MD_CellGeometryCode) area
    transformationParameterAvailability: true

checkPointAvailability: false
pointInPixel: (MD_PixelOrientationCode) upperLeft
transformationDimensionDescription: Full Disk

---

spatialRepresentationInfo: (MD_Georectified)
  numberOfDimensions: 2
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) row
    dimensionSize: 156
    resolution:
     Distance: 25
  axisDimensionProperties: (MD_Dimension)
    dimensionName: (MD_DimensionNameTypeCode) column
    dimensionSize: 380
    resolution:
     Distance: 25
  cellGeometry: (MD_CellGeometryCode) area
  transformationParameterAvailability: true
  checkPointAvailability: false
  pointInPixel: (MD_PixelOrientationCode) upperLeft
  transformationDimensionDescription: CONUS

---

referenceSystemInfo: (MD_ReferenceSystem)
  referenceSystemIdentifier: (RS_Identifier)
    authority: (CI_Citation)
     title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) publication
     otherCitationDetails: The data points on GOES-R Radiation products use the latitude_longitude CF grid mapping. This grid mapping defines the canonical 2D geographical coordinate system based upon latitude and longitude coordinates on a spherical Earth. It is included so that the figure of the Earth can be described.
    code: latitude_longitude
    codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: ABI Level 2+ Reflected Shortwave Radiation: Top-Of-Atmosphere Product
    alternateTitle: Data short name (DSN): ABI-L2-RSRC-M3
    alternateTitle: Data short name (DSN): ABI-L2-RSRC-M4
    alternateTitle: Data short name (DSN): ABI-L2-RSRF-M3
    alternateTitle: Data short name (DSN): ABI-L2-RSRF-M4
    date: (CI_Date)

date: 2014-10-18
dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
authority: (CI_Citation)
title: gov.nesdis.noaa
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) revision
code: ABI-L2-RSR
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
abstract: The Reflected Shortwave Radiation: TOA product contains an image with pixel values identifying the instantaneous total shortwave irradiance (flux) emerging at the Earth's TOA integrated over the 0.2 to 4.0 um wavelength bandpass. It includes contributions from the solar radiation reflected upward by the Earth's surface and that scattered by the atmosphere. The product includes data quality information that provides an assessment of the reflected shortwave radiation: TOA data values for on-earth pixels. The units of measure for the reflected shortwave radiation: TOA value is watts per square meter. The Reflected Shortwave Radiation: TOA product image is produced on a global latitude/longitude grid at 0.25 degree resolution for Full Disk and CONUS coverage regions. Product data is produced for geolocated source data to local zenith angles of 90 degrees and solar zenith angles to 90 degrees.
pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)

keyword: ATMOSPHERE > ATMOSPHERIC RADIATION > SHORTWAVE
RADIATION
 type: (MD_KeywordTypeCode) theme
 thesaurusName: (CI_Citation)
  title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
  date: (CI_Date)
   date: 2012-10
   dateType: (CI_DateTypeCode) revision
  edition: Version 7.0.0.0.0
  citedResponsibleParty: (CI_ResponsibleParty)
   individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens,
M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M.
Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
   role: (CI_RoleCode) author
 descriptiveKeywords: (MD_Keywords)
  keyword: toa_outgoing_shortwave_flux
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
   title: CF Standard Name Table v25
   date: (CI_Date)
    date: 2013-07-05
    dateType: (CI_DateTypeCode) revision
 resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
 spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
 spatialResolution: (MD_Resolution)
  distance:
   Distance: 25
 language: eng; USA
 topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
 extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
   extent:
    TimePeriod:
    beginPosition: 2014-10-18
    endPosition: now
 extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
   geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
   westBoundLongitude: -156.50
   eastBoundLongitude: 6.50
   southBoundLatitude: -81.50
   northBoundLatitude: 81.50
 extent: (EX_Extent)

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geographicElement: (EX_GeographicDescription)
  geographicIdentifier: (MD_Identifier)
    code: Full Disk - GOES-West
geographicElement: (EX_GeographicBoundingBox)
  westBoundLongitude: 141.50
  eastBoundLongitude: -55.50
  southBoundLatitude: -81.50
  northBoundLatitude: 81.50
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -151.75
    eastBoundLongitude: -53.25
    southBoundLatitude: 14.25
    northBoundLatitude: 55.75
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: CONUS - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: 175.5
    eastBoundLongitude: -89.5
    southBoundLatitude: 14.50
    northBoundLatitude: 53.5

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: RSR
      attributeType:
    descriptor: ABI Level 2+ Reflected Shortwave Radiation: TOA
    units:
     DerivedUnit:
      identifier: W m-2
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

          NON-Export Controlled Information

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: DQF
     attributeType:
   descriptor: ABI Level 2+ Reflected Shortwave Radiation: TOA data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) series
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Start, midpoint, and end time of the product image observation period; Number of attempted retrievals; Number of attempted retrievals to local zenith angle of 70 degrees; Number of reflected shortwave radiation: TOA pixels whose values are outside the required measurement range; Cloud fraction in product image; Minimum, maximum, mean, and standard deviation of the solar zenith angle values for the product image's pixels; Minimum, maximum, mean, and standard deviation of the reflected shortwave radiation: TOA values in the product image. The attempted retrieval count, cloud fraction, and solar zenith angle statistics are calculated using geolocated pixels to a solar zenith angle of 90 degrees. The downward shortwave radiation: surface outlier count and other statistics are calculated using good quality pixels to a local zenith angle to 70 degrees and solar zenith angle to 70 degrees. The percentages of pixels assigned to each DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:
      identifier: percent
      unitsSystem:
    value:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_GRB_errors
   evaluationMethodDescription: percent data lost due to uncorrectable GRB errors
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:

        identifier: percent
        unitsSystem:
      value:
    lineage: (LI_Lineage)
     processStep: (LE_ProcessStep)
      description: The Reflected Shortwave Radiation: TOA product is generated by the GOES-R ABI Downward Shortwave Radiation: Surface and Reflected Shortwave Radiation: TOA ground processing algorithm. Depending on the availability of inputs, the algorithm performs either a "direct" or "indirect" retrieval of broadband transmittance and reflectance over four scene types: clear sky over no snow/ice; clear sky over snow/ice; water cloud, and; ice cloud. The "direct" retrieval is primary method. Computed atmospheric transmittance and reflectance are used to derive the shortwave fluxes at the surface and TOA. The "direct" retrieval path uses ABI products to estimate fluxes from Level 2 processing parameter lookup tables whose values are based on a forward radiative transfer model. When inputs needed for the "direct" retrieval path are not available, the algorithm uses the "indirect" retrieval path, invoking a multistep inversion scheme. The "indirect" retrieval path includes the calculation of a clear-sky snow/ice-free compostite TOA albedo derived from the ABI reflectance observations over the previous 29 days. Both retrieval paths rely on primary inputs at 2 km resolution that are averaged over each scene type on the output global latitude/longitude grid. Grid cells within the product extent not represented by a direct mapping between the ABI fixed grid and the global latitude/longitude grid are assigned values based on the nearest neighbor. The coverage region included in the Full Disk and CONUS radiation products is the minimum bounding rectangle within the global latitude/longitude grid. In the case of the mesoscale coverage region, the radiation product data structure dimensions are fixed and based on its maximum latitude/longitude extent on the ABI Full Disk. Pixels in the product image with out of range values are assigned the minimum or maximum value in the valid range.
      processor: (CI_ResponsibleParty)
       organisationName: NESDIS/OSPO at NSOF (NOAA Satellite Operations Facility, Suitland, MD)
       role: (CI_RoleCode) processor
     output: (LE_Source)
      processedLevel: (MD_Identifier)
       authority: (CI_Citation)
        title: NOAA Processing Levels
        date: (CI_Date)
         date: 2013-11
         dateType: (CI_DateTypeCode) revision
        citedResponsibleParty: (CI_ResponsibleParty)
        organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
         contactInfo: (CI_Contact)
          onlineResource: (CI_OnlineResource)
           linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels
         role: (CI_RoleCode) publisher
      code: L2

metadataMaintenance: (MD_MaintenanceInformation)
    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
    maintenanceNote: ISO Series metadata contain quasi-static general information about a
collection of datasets of a particular product that changes infrequently

  acquisitionInformation: (MI_AcquisitionInformation)
    operation: (MI_Operation)
      description: The Geostationary Operational Environmental Satellite-R Series (GOES-R)
is the United States Government geostationary weather satellite series having an operational life-
cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the
GOES-R series result in more timely and accurate forecasts and warnings than previous
generations, including the capability to image its near hemispherical field of view in five minutes.
The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and
lightning detection capability improves support for the detection and observations of
meteorological phenomena that directly affect public safety, protection of property, and
ultimately, economic health and development. The GOES-R series was a collaborative
development and acquisition effort between the National Oceanic and Atmospheric
Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The
GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's
Western Hemisphere and space weather monitoring. It is the primary tool for the detection and
tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of
Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis
stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit
storage. The satellite operates through periodic station-keeping and momentum transfer
maneuvers, which allow for near-continuous instrument observations.
        identifier: (MD_Identifier)
          authority: (CI_Citation)
            title: http://science.nasa.gov/missions/goes-r/
            date:
          code:
        status: (MD_ProgressCode) onGoing
        parentOperation:
        platform: (MI_Platform)
          identifier: (MD_Identifier)
            authority: (CI_Citation)
              title: http://www.goes-r.gov
              date:
            code: GOES-East (G16)
        description: The GOES-R System acquires and disseminates environmental data from
geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and
the in-situ space environment. The major functions of the GOES-R System are to support,
process, and distribute the data from its instruments, specifically the Advanced Baseline Imager
(ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and
XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer.
Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning

detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/abi.html
> > > > **date:**
> > > **code:** GOES-16 ABI instrument_id (serial number)
> > **type:** Advanced Baseline Imager
> > **description:** The Advanced Baseline Imager is the primary instrument on GOES-16

for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-16 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs)

and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

        instrument: (MI_Instrument)
           identifier: (MD_Identifier)
             authority: (CI_Citation)
                title: http://www.goes-r.gov/spacesegment/abi.html
                date:
             code: GOES-17 ABI instrument_id (serial number)
           type: Advanced Baseline Imager
           description: The Advanced Baseline Imager is the primary instrument on GOES-17 for imaging Earth's weather, climate, and environment. The ABI observes the Earth at 16 different spectral bands, including two visible channels, four near-infrared channels, and ten infrared channels. The products generated from ABI observations provides spatial resolutions between 0.5 and 2.0 km. Forecasters use these high resolution images to track the development of storms in their early stages. The GOES-17 ABI is used for a wide range of applications related to weather, oceans, land, climate, and hazards (fires, volcanoes, hurricanes, and storms that spawn tornados). The ABI has three scan modes that produce imagery data. The continuous full disk mode (Mode 4) provides uninterrupted scans of the full disk every 5 minutes. Mode 3 concurrently allows full disk imagery every 15 minutes, the continental US (CONUS) every 5 minutes, and two interleaved mesoscale regions with each viewed every 60 seconds. And Mode 6 scans the full disk every 10 minutes, CONUS every 5 minutes, and mesoscale regions every 60 seconds. The ABI is calibrated to an accuracy of 3% (1 σ) radiance for visible and near-infrared wavelengths. For infrared channels, the ABI is accurate to 1K (1 σ) at 300K.

5.1.25   Surface Albedo Product

The current ground system baseline does not produce the Surface Albedo product.

5.1.26   Lightning Detection Product ISO Series Metadata

 (MI_Metadata)
   fileIdentifier: f5816f53-fd6d-11e3-a3ac-0800200c9a66
   language: eng
   characterSet: (MD_CharacterSetCode) utf8
   parentIdentifier: n/a
   hierarchyLevel: (MD_ScopeCode) series
   hierarchyLevelName: ISO Series Metadata for GLM Level 2+ Lightning Detection Product Collection
   contact: (CI_ResponsibleParty)
     organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD

postalCode: 20910
country: USA
electronicMailAddress: GOES-R@noaa.gov
role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions
for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_GLM-L2-LCFA-ISO-SERIES_c20171311307000.xml

---

referenceSystemInfo: (MD_ReferenceSystem)
referenceSystemIdentifier: (RS_Identifier)
authority: (CI_Citation)
title: Product Definition and Users Guide (PUG) Volume 5: Level 2+ Products
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) publication
otherCitationDetails: The data points on GOES-R GLM products use the
latitude_longitude CF grid mapping. This grid mapping defines the canonical 2D geographical
coordinate system based upon latitude and longitude coordinates on a spherical Earth. It is
included so that the figure of the Earth can be described.
code: latitude_longitude
codeSpace: http://cfconventions.org/latest.html

---

identificationInfo: (MD_DataIdentification)
citation: (CI_Citation)
title: GLM Level 2+ Lightning Detection Product
alternateTitle: Data short name (DSN): GLM-L2-LCFA
date: (CI_Date)
date: 2017-05-11
dateType: (CI_DateTypeCode) creation
identifier: (MD_Identifier)
authority: (CI_Citation)
title: gov.nesdis.noaa
date: (CI_Date)
date: 2014
dateType: (CI_DateTypeCode) revision
code: GLM-L2-LCFA
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring

administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
abstract: The Lightning Detection product contains a list of lightning flashes, and their constituent groups and events. The definition of and relationship among flashes, groups, and events are governed by the following spatial and temporal characteristics: An event represents the signal detected from the cloud top associated with a lightning emission in an individual sensor pixel for a 2 ms integration period; A group represents the events detected in adjacent sensor pixels for the same integration period as an event; A flash represents a series of measurements constrained by temporal and spatial extent thresholds that are associated with one or more groups. The parent, child relationship among specific flashes, groups, and events is stored in the product. Data for each flash includes an energy-weighted centroid latitude, longitude location, time span of occurrence, amount of radiant energy, and coverage area. Data for each group includes an energy-weighted centroid latitude, longitude location, mean time of occurrence, amount of radiant energy, and coverage area. Data for each event includes a latitude, longitude location, time of occurrence, and amount of radiant energy. The product includes data quality information for each flash and group. A Lightning Detection product file contains a set of flashes, and its constituent groups and events for a 20 second period. The units of measure for the flash, group, and event radiant energy values is joules. The units of measure for the flash and group coverage areas is square kilometers.
pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: netCDF
version: 4
descriptiveKeywords: (MD_Keywords)
keyword: ATMOSPHERE > ATMOSPHERIC ELECTRICITY > LIGHTNING
keyword: ATMOSPHERE > ATMOSPHERIC PHENOMENA > LIGHTNING
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0

citedResponsibleParty: (CI_ResponsibleParty)
    individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
    role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
  keyword: lightning_radiant_energy
  type: (MD_KeywordTypeCode) theme
  thesaurusName: (CI_Citation)
    title: CF Standard Name Table v25
    date: (CI_Date)
      date: 2013-07-05
      dateType: (CI_DateTypeCode) revision
resourceConstraints: (MD_SecurityConstraints)
  useLimitation: Unrestricted
  classification: (MD_ClassificationCode) unclassified
spatialRepresentationType: (MD_SpatialRepresentationTypeCode) grid
spatialResolution: (MD_Resolution)
  distance:
   Distance: 8
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere
extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-East
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -141.56
    eastBoundLongitude: -8.44
    southBoundLatitude: -66.56
    northBoundLatitude: 66.56
extent: (EX_Extent)
  geographicElement: (EX_GeographicDescription)
    geographicIdentifier: (MD_Identifier)
      code: Full Disk - GOES-West
  geographicElement: (EX_GeographicBoundingBox)
    westBoundLongitude: -203.56
    eastBoundLongitude: -70.44
    southBoundLatitude: -66.56

northBoundLatitude: 66.56

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  rangeElementDescription: (MI_RangeElementDescription)
   name: event_lat
   definition: latitude degrees north
   rangeElement:
    Record: GLM L2+ Lightning Detection: event latitude coordinate
  rangeElementDescription: (MI_RangeElementDescription)
   name: event_lon
   definition: longitude degrees east
   rangeElement:
    Record: GLM L2+ Lightning Detection: event longitude coordinate

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: event_time_offset
     attributeType:
   descriptor: GLM Level 2+ Lightning Detection: event's time of occurrence
   units:
    DerivedUnit:
     identifier: milliseconds since start time of product
     derivationUnitTerm:
     derivationUnitTerm:
   scaleFactor:
   offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: event_energy
     attributeType:

descriptor: GLM Level 2+ Lightning Detection: event radiant energy
units:
  DerivedUnit:
   identifier: J
   derivationUnitTerm:
  scaleFactor:
  offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: group_time_offset
      attributeType:
    descriptor: GLM Level 2+ Lightning Detection: mean time of group's constituent
events' times of occurrence
    units:
     DerivedUnit:
      identifier: milliseconds since start time of product
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
    sequenceIdentifier:
     MemberName:
      aName: group_energy
      attributeType:
    descriptor: GLM Level 2+ Lightning Detection: group radiant energy
    units:
     DerivedUnit:
      identifier: J
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: group_area
     attributeType:
   descriptor: GLM Level 2+ Lightning Detection: group area coverage (pixels containing at least one constituent event only)
    units:
     DerivedUnit:
      identifier: km2
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: flash_time_offset_of_first_event
     attributeType:
   descriptor: GLM Level 2+ Lightning Detection: time of occurrence of first constituent event in flash
    units:
     DerivedUnit:
      identifier: milliseconds since start time of product
      derivationUnitTerm:
      derivationUnitTerm:
    scaleFactor:
    offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) physicalMeasurement
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:

aName: flash_time_offset_of_last_event
attributeType:
descriptor: GLM Level 2+ Lightning Detection: time of occurrence of last constituent
event in flash
units:
DerivedUnit:
identifier: milliseconds since start time of product
derivationUnitTerm:
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) physicalMeasurement
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: flash_energy
attributeType:
descriptor: GLM Level 2+ Lightning Detection: flash radiant energy
units:
DerivedUnit:
identifier: J
derivationUnitTerm:
scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
attributeDescription:
RecordType: variable
contentType: (MD_CoverageContentTypeCode) physicalMeasurement
dimension: (MD_Band)
sequenceIdentifier:
MemberName:
aName: flash_area
attributeType:
descriptor: GLM Level 2+ Lightning Detection: flash area coverage (pixels containing
at least one constituent event only)
units:
DerivedUnit:
identifier: km2
derivationUnitTerm:
derivationUnitTerm:

scaleFactor:
offset:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: group_quality_flag
     attributeType:
   descriptor: GLM Level 2+ Lightning Detection: group data quality flags
   units:

---

contentInfo: (MI_CoverageDescription)
  attributeDescription:
   RecordType: variable
  contentType: (MD_CoverageContentTypeCode) thematicClassification
  dimension: (MD_Band)
   sequenceIdentifier:
    MemberName:
     aName: flash_quality_flag
     attributeType:
   descriptor: GLM Level 2+ Lightning Detection: flash data quality flags
   units:

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) dataset
  report: (DQ_QuantitativeAttributeAccuracy)
   nameOfMeasure: Product summary statistics
   evaluationMethodDescription: Approximate start and end time of the observation period; Number of flashes, groups, and events; Satellite yaw flip configuration. The percentages of pixels assigned to each flash and group DQF value are also included in the product.
   result:
  report: (DQ_CompletenessOmission)
   nameOfMeasure: percent_uncorrectable_L0_errors
   evaluationMethodDescription: Percentage of Raw Data CCSDS Channel Access Data Units (CADUs) received with bit errors too numerous to be corrected by the Low Density Parity Check Forward Error Correction coding.
   result: (DQ_QuantitativeResult)
    valueUnit:
     BaseUnit:

identifier: percent
unitsSystem:
value:
lineage: (LI_Lineage)
processStep: (LE_ProcessStep)
description: The Lightning Detection product is generated by the sequential execution of Level 0, Level 1b and Level 2+ ground processing algorithms. The Level 2+ algorithm is the GOES-R GLM Lightning Cluster-Filter algorithm. The Level 0 algorithm decompresses and extracts events and GLM background image data from the CCSDS packets. The GLM instrument detects areas of potential lightning by capturing optical images of the Earth in its field of view, and identifying potential lightning events based on transient emissions from the tops of cloud. GLM Level 1b algorithm ground processing filters false lightning events using spatial and temporal thresholds and tracking tests. Each event remaining after filtering is radiometrically corrected, navigated to latitude, longitude coordinates, and time-tagged. The time-tag is corrected for light propagation time from cloud to satellite. The Level 2+ Lightning Detection algorithm clusters the events into groups and flashes based on spatial and temporal threshold parameters. Events, groups, and flashes are related in a tree-like structure with each flash made up of a unique set of groups and each group made up of a unique set of events. For each group and flash, the centroid location is its optically-weighted position, the energy is the sum of its events' energies, and its area is the sum of the areas covered by its events' pixels. Flashes from cloud-to-ground lightning and intra-cloud lightning are not distinguished. The wavelength of the radiant energy sensed by the instrument is from 776.87 to 777.87 nm at half the maximum of the spectral response function. The Level 1b and Level 2+ processing algorithms are executed at a cadence of once per second. The flashes for which processing has completed are included in the 20 second products. This means that event, group, time stamp values may be prior to the 20 second period associated with the particular product instance. These algorithms are designed subject to requirements for the maximum event, group, and flash rates to ensure that ground system processing operates at the data rate for lightning in the sensor's field of view.
processor: (CI_ResponsibleParty)
organisationName: WCDAS (Wallops Command and Data Acquisition Station, Wallops Island, VA), RBU (Remote Backup Unit, Fairmont, WV)
role: (CI_RoleCode) processor
processor: (CI_ResponsibleParty)
organisationName: RBU (Remote Backup Unit, Fairmont, WV)
role: (CI_RoleCode) processor
output: (LE_Source)
processedLevel: (MD_Identifier)
authority: (CI_Citation)
title: NOAA Processing Levels
date: (CI_Date)
date: 2013-11
dateType: (CI_DateTypeCode) revision
citedResponsibleParty: (CI_ResponsibleParty)
organisationName: National Oceanographic and atmospheric Administration (NOAA) National Geophysical Data Center (NGDC)
contactInfo: (CI_Contact)
onlineResource: (CI_OnlineResource)

linkage: https://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Proc essing_Levels

role: (CI_RoleCode) publisher
code: L2

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metadataMaintenance: (MD_MaintenanceInformation)
maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a product line that changes infrequently

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acquisitionInformation: (MI_AcquisitionInformation)
operation: (MI_Operation)
description: The Geostationary Operational Environmental Satellite-R Series (GOES-R) is the United States Government geostationary weather satellite series having an operational life-cycle from 2016 to the 2030s. The advanced spacecraft and instrument technology used on the GOES-R series result in more timely and accurate forecasts and warnings than previous generations, including the capability to image its near hemispherical field of view in five minutes. The sixteen imaging channels supporting product resolutions between 0.5 and 2.0 km, and lightning detection capability improves support for the detection and observations of meteorological phenomena that directly affect public safety, protection of property, and ultimately, economic health and development. The GOES-R series was a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). The GOES-R satellite provides continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. It is the primary tool for the detection and tracking of hurricanes and severe weather and is a key enabler for fulfilling NOAA's goals of Water and Weather, Climate, Commerce, and Ecosystem. The GOES-R spacecraft is 3-axis stabilized and designed for 10 years of on-orbit operation preceded by up to 5 years of on-orbit storage. The satellite operates through periodic station-keeping and momentum transfer maneuvers, which allow for near-continuous instrument observations.
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://science.nasa.gov/missions/goes-r/
date:
code:
status: (MD_ProgressCode) onGoing
parentOperation:
platform: (MI_Platform)
identifier: (MD_Identifier)
authority: (CI_Citation)
title: http://www.goes-r.gov
date:
code: GOES-East (G16)
description: The GOES-R System acquires and disseminates environmental data from geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and

the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and the second at 137° West longitude.

> **instrument:** (MI_Instrument)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov/spacesegment/glm.html
> > > > **date:**
> > > **code:** GOES-16 GLM serial number
> > **type:** Geostationary Lightning Mapper
> > **description:** The Geostationary Lightning Mapper (GLM) is an optical transient

detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 8 km continuously day and night over the Americas and adjacent ocean regions. The GLM provides early indication of storm intensification and severe weather events, improved tornado warning lead time, and data for long-term climate variability studies. The GLM provides information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

> **platform:** (MI_Platform)
> > **identifier:** (MD_Identifier)
> > > **authority:** (CI_Citation)
> > > > **title:** http://www.goes-r.gov
> > > > **date:**
> > > **code:** GOES-West (G17)
> > **description:** The GOES-R System acquires and disseminates environmental data from

geostationary orbit. The system observes the Earth's surface and atmosphere, solar activity, and the in-situ space environment. The major functions of the GOES-R System are to support, process, and distribute the data from its instruments, specifically the Advanced Baseline Imager (ABI), Geostationary Lightning Mapper (GLM), Solar Ultraviolet Imager (SUVI), EUVS and XRS Irradiance Sensors (EXIS), Space Environment In-Situ Suite (SEISS) and Magnetometer. Other functions of the GOES-R System are to: (1) rebroadcast Level 1b and Level 2+ lightning detection products generated by the GOES-R System (GRB), (2) support terrestrial and oceanographic Data Collection Platforms (DCPs), (3) relay High Rate Information Transmission (HRIT) data between earth terminals and relay the Emergency Managers Weather Information Network (EMWIN) broadcast on the HRIT/EMWIN link, and (4) provide rapid detection of distress messages from the Search and Rescue (SAR) Emergency Locator Transmitters (ELTs) and Emergency Position Indicating Radio Beacons (EPIRBs). The GOES operational constellation provides coverage operationally from two locations, one at 75° West longitude and

the second at 137° West longitude.

    instrument: (MI_Instrument)
      identifier: (MD_Identifier)
        authority: (CI_Citation)
          title: http://www.goes-r.gov/spacesegment/glm.html
          date:
        code: GOES-17 GLM serial number
      type: Geostationary Lightning Mapper
      description: The Geostationary Lightning Mapper (GLM) is an optical transient detector and imager operating in the near-IR that maps total lightning (in-cloud and cloud-to-ground) activity with near uniform spatial resolution of approximately 8 km continuously day and night over the Americas and adjacent ocean regions. The GLM provides early indication of storm intensification and severe weather events, improved tornado warning lead time, and data for long-term climate variability studies. The GLM provides information to identify growing, active, and potentially destructive thunderstorms over land as well as ocean areas.

5.2 Level 2+ Data

5.2.1 Level 2+ Semi-Static Source Data

  (MI_Metadata)
    fileIdentifier: 10d80d3e-ef77-11e5-9ce9-5e5517507c66
    language: eng
    characterSet: (MD_CharacterSetCode) utf8
    parentIdentifier: n/a
    hierarchyLevel: (MD_ScopeCode) series
    hierarchyLevelName: ISO Series Metadata for GOES-R L2 Processing Parameters Collection
    contact: (CI_ResponsibleParty)
      organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: GOES-R@noaa.gov
      role: (CI_RoleCode) originator
    dateStamp: 2017-05-15
    metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2 Extensions for imagery and gridded data
    metadataStandardVersion: ISO 19115-2:2009(E)
    dataSetURI: OR_PARM-L2-ISO-SERIES_c20171351618000.xml

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
    title: GOES-R L2 Processing Parameters
    alternateTitle: Data short name (DSN): PARM-L2-ISO-SERIES
    date: (CI_Date)
      date: 2017-05-15
      dateType: (CI_DateTypeCode) creation
    identifier: (MD_Identifier)
      authority: (CI_Citation)
        title: Product Definition and Users Guide (PUG) Volume 1: Main
        date: (CI_Date)
          date: 2016
          dateType: (CI_DateTypeCode) revision
      code: GOES-R Document Control Number: 7035538
    citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov
      role: (CI_RoleCode) originator
  abstract: Processing parameters are used as a direct input to the GOES-R ground processing algorithms. There are three categories of semi-static source data used in the Advanced Baseline Imager (ABI) Level 2 ground processing algorithm, 1) Algorithm-specific parameters, such as qualification thresholds and limits, look-up tables, conversion factors, and minimum and maximum valid ranges, 2) Common library parameters, such as band wavelength maps, Planck look-up tables, pixel displacement parameters, and other constant values, 3) Gridded parameters, such as parameters used in projection and mapping. Geostationary Lightning Mapper (GLM) uses radiometric calibration parameters (associated with the instrument's observing characteristics); geometric calibration parameters (associated with the precise look angle and size of the field of view); as well as algorithm processing parameters (associated with configurable decision-making logic in the algorithm as well as spatial and temporal thresholds, look up tables and scales an offsets applied to output values.
  pointOfContact: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
      contactInfo: (CI_Contact)
        address: (CI_Address)
          deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
          city: Silver Spring
          administrativeArea: MD
          postalCode: 20910
          country: USA
          electronicMailAddress: goes-r@noaa.gov

        NON-Export Controlled Information

      role: (CI_RoleCode) originator

    resourceFormat: (MD_Format)

      name: zip

      version:

    descriptiveKeywords: (MD_Keywords)

      keyword: Earth Observation Satellites > GOES (Geostationary Operational Environmental Satellite) > GOES-R

        type: (MD_KeywordTypeCode) theme

        thesaurusName: (CI_Citation)

          title: NASA Global Change Master Directory (GCMD) Earth Science Keywords

          date: (CI_Date)

            date: 2012-10

            dateType: (CI_DateTypeCode) revision

          edition: Version 7.0.0.0.0

          citedResponsibleParty: (CI_ResponsibleParty)

            individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea

            role: (CI_RoleCode) author

    descriptiveKeywords: (MD_Keywords)

      keyword: semi-static processing parameters

    resourceConstraints: (MD_SecurityConstraints)

      useLimitation: Unrestricted

      classification: (MD_ClassificationCode) unclassified

    language: eng; USA

    characterSet: (MD_CharacterSetCode) utf8

    topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere

    extent: (EX_Extent)

      temporalElement: (EX_TemporalExtent)

        extent:

          TimePeriod:

          beginPosition: 2017-05-15

          endPosition: now

---

  metadataMaintenance: (MD_MaintenanceInformation)

    maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded

    maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

5.2.2   Level 2+ Algorithm Packages

(MI_Metadata)

  fileIdentifier: 808dfb20-3a75-11e3-aa6e-0800200c9a66

  language: eng

  characterSet: (MD_CharacterSetCode) utf8

  parentIdentifier: n/a

        NON-Export Controlled Information

hierarchyLevel: (MD_ScopeCode) series
hierarchyLevelName: ISO Series Metadata for GOES-R L2 Algorithm Package
Collection
contact: (CI_ResponsibleParty)
   organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data,
and Information Services, NOAA, U.S. Department of Commerce
   contactInfo: (CI_Contact)
    address: (CI_Address)
     deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
     city: Silver Spring
     administrativeArea: MD
     postalCode: 20910
     country: USA
     electronicMailAddress: GOES-R@noaa.gov
   role: (CI_RoleCode) originator
dateStamp: 2017-05-11
metadataStandardName: ISO 19115-2 Geographic Information - Metadata Part 2
Extensions for imagery and gridded data
metadataStandardVersion: ISO 19115-2:2009(E)
dataSetURI: OR_ALG-L2-ISO-SERIES_c20171311357000.xml

---

identificationInfo: (MD_DataIdentification)
  citation: (CI_Citation)
   title: GOES-R L2 Algorithm Package
   alternateTitle: Data short name (DSN): ALG-L2-ISO-SERIES
   date: (CI_Date)
    date: 2017-05-11
    dateType: (CI_DateTypeCode) creation
   identifier: (MD_Identifier)
    authority: (CI_Citation)
     title: gov.nesdis.noaa
     date: (CI_Date)
      date: 2014
      dateType: (CI_DateTypeCode) revision
    code: ALG-L2-ISO-SERIES
   citedResponsibleParty: (CI_ResponsibleParty)
    organisationName: DOC/NOAA/NESDIS > National Environmental Satellite,
Data, and Information Services, NOAA, U.S. Department of Commerce
    contactInfo: (CI_Contact)
     address: (CI_Address)
      deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
      city: Silver Spring
      administrativeArea: MD
      postalCode: 20910

NON-Export Controlled Information

country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
abstract: Each Algorithm Package includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), and descriptive information. Each ATBD will include an overview, logic flow, assumptions, theoretical/math description, limitations, exception handling, inputs/outputs, and software implementation considerations.
pointOfContact: (CI_ResponsibleParty)
organisationName: DOC/NOAA/NESDIS > National Environmental Satellite, Data, and Information Services, NOAA, U.S. Department of Commerce
contactInfo: (CI_Contact)
address: (CI_Address)
deliveryPoint: 1335 East-West Highway, SSMC1, 8th Floor
city: Silver Spring
administrativeArea: MD
postalCode: 20910
country: USA
electronicMailAddress: goes-r@noaa.gov
role: (CI_RoleCode) originator
resourceFormat: (MD_Format)
name: zip
version:
descriptiveKeywords: (MD_Keywords)
keyword: Earth Observation Satellites > GOES (Geostationary Operational Environmental Satellite) > GOES-R
type: (MD_KeywordTypeCode) theme
thesaurusName: (CI_Citation)
title: NASA Global Change Master Directory (GCMD) Earth Science Keywords
date: (CI_Date)
date: 2012-10
dateType: (CI_DateTypeCode) revision
edition: Version 7.0.0.0.0
citedResponsibleParty: (CI_ResponsibleParty)
individualName: Olsen, L.M., G. Major, K. Shein, J. Scialdone, S. Ritz, T. Stevens, M. Morahan, A. Aleman, R. Vogel, S. Leicester, H. Weir, M. Meaux, S. Grebas, C.Solomon, M. Holland, T. Northcutt, R. A. Restrepo, R. Bilodea
role: (CI_RoleCode) author
descriptiveKeywords: (MD_Keywords)
keyword: Algorithm Package
resourceConstraints: (MD_SecurityConstraints)
useLimitation: Unrestricted
classification: (MD_ClassificationCode)
language: eng; USA
characterSet: (MD_CharacterSetCode) utf8
topicCategory: (MD_TopicCategoryCode) climatologyMeteorologyAtmosphere

extent: (EX_Extent)
  temporalElement: (EX_TemporalExtent)
    extent:
     TimePeriod:
      beginPosition: 2017-05-11
      endPosition: now

---

dataQualityInfo: (DQ_DataQuality)
  scope: (DQ_Scope)
   level: (MD_ScopeCode) series
  lineage: (LI_Lineage)
   source: (LI_Source)
    description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), for the following algorithms: Advanced Baseline Imager (ABI) L2 Cloud and Moisture Imagery Channel 1 through ABI L2 Cloud and Moisture Imagery Channel 16 algorithms and the ABI L2 Cloud and Moisture Imagery Multiband Algorithm, and all ABI L2 derived product algorithms.
   source: (LI_Source)
    description: Includes the Algorithm Theoretical Basis Document (ATBD), data files (synthetic input, output, and ancillary), for the following algorithm: Geostationary Lightning Mapper (GLM).

---

metadataMaintenance: (MD_MaintenanceInformation)
  maintenanceAndUpdateFrequency: (MD_MaintenanceFrequencyCode) asNeeded
  maintenanceNote: GOES-R ISO Series metadata contain quasi-static general information about a collection of datasets of a product line that changes infrequently

6.0 ISO SERIES METADATA FILENAME CONVENTIONS

The main volume of the PUG contains a summary level description of the filename conventions used for all GOES-R product and data files. This appendix contains the detailed filename conventions for Level 0, 1b, and 2+ product and data ISO series metadata.

As discussed in the main volume of the PUG, filenames consist of a set of string fields delimited by an underscore or a period that are concatenated together. The content and format of several of the filename string fields are common across more than one of the ISO series metadata product and data filenames. Refer to Table 6.0-1, Common Filename String Fields.

Table 6.0-1   Common Filename String Fields

Common String Field	Description	Values and Meanings

Creation Date & Time	Date & time the file is created.	"cYYYYDDDHHMMSSs" Notes: ➢ YYYY = year: e.g., 2015 ➢ DDD = day of year: 001-366 ➢ HH = UTC hour of day: 00-23 ➢ MM = minute of hour: 00-59 ➢ SS = second of minute: 00-59 (60 indicates leap second, and third "s" is tenth of second)

Table 6.0-2, Appendix X Filename Convention Paragraphs for Specific ISO Series Metadata Types, identifies the subordinate paragraph where ISO series metadata are defined for GOES-R products and data. In addition, example filenames are included in the subordinate paragraphs.

Table 6.0-2   Appendix X Filename Convention Paragraphs for

Specific ISO Series Metadata Types

Level 1b Product or Data Types	Appendix X Paragraph
Level 0 Products	Paragraph 6.1
Level 1b Products and Data, and GRB Information	Paragraph 6.2
Level 2+ Products and Data	Paragraph 6.3

6.1   Level 0 Products

Level 0 product ISO series metadata filenames are assembled using filename string fields as follows:

<DSN>_Version.<File Extension>

Different ISO series metadata files have unique DSNs. Refer to Table 6.1, Level 0 ISO Series Metadata DSNs.

Table 6.1   Level 0 ISO Series Metadata DSNs

Type of Level 1b Product or Data	ISO Series Metadata DSN	Specific Product
Level 0 Product	OR_ABI-L0-ISO-SERIES	ABI Level 0 Product
	OR_GLM-L0-ISO-SERIES	GLM Level 0 Product
	OR_SUVI-L0-ISO-SERIES	SUVI Level 0 Product
	OR_EXIS-L0-ISO-SERIES	EXIS Level 0 Product
	OR_SEIS-L0-ISO-SERIES	SEISS Level 0 Product
	OR_MAG-L0-ISO-SERIES	Magnetometer Level 0 Product

The file extension for ISO series metadata files is ".xml".

The filename for the third major version, second minor revision to SEISS Level 0 ISO series metadata is:

"OR_SEISS-L0-ISO-SERIES_v0302.xml"

6.2   Level 1b Products and Data

Level 1b ISO series metadata filenames are assembled using filename string fields as follows:

<DSN>_<Creation Date & Time>.<File Extension>

The relationship between different ISO series metadata files and the other GOES-R Level 1b products and data files varies as a function of the type of product or data. The relationship between Level 1b product and data files is as follows:

- Each Level 1b product is associated with a unique ISO series metadata file.
- All of the types of GRB information data files are associated with a unique ISO series metadata file.
- ABI sample outlier data file is associated with a unique ISO series metadata file.
- All of the types of instrument calibration data files are associated with a shared, but unique ISO series metadata file.
- All of the types of Level 1b semi-static source data are associated with a shared, but unique ISO series metadata file.
- All of the types of Level 1b algorithm package files are associated with a shared, but unique ISO series metadata file.

Different ISO series metadata files have unique DSNs. Refer to Table 6.2, Level 1b ISO Series Metadata DSNs.

Table 6.2   Level 1b ISO Series Metadata DSNs

Type of Level 1b Product or Data	ISO Series Metadata DSN	Specific Product
Level 1b Product	OR_ABI-L1b-Rad-ISO-SERIES	Radiances
	OR_SUVI-L1b-SUVI-ISO-SERIES	Solar Imagery: X-Ray
	OR_EXIS-L1b-SFXR-ISO-SERIES	Solar Flux: X-Ray
	OR_EXIS-L1b-SFEU-ISO-SERIES	Solar Flux: EUV
	OR_SEIS-L1b-EHIS-ISO-SERIES	Energetic Heavy Ions
	OR_SEIS-L1b-MPSL-ISO-SERIES	Magnetospheric Electrons and Protons: Low Energy
	OR_SEIS-L1b-MPSH-ISO-SERIES	Magnetospheric Electrons and Protons: Medium and High Energy
	OR_SEIS-L1b-SGPS-ISO-SERIES	Solar and Galactic Protons
	OR_MAG-L1b-GEOF-ISO-SERIES	Geomagnetic Field
GRB Information	OR_GRB-INFO-ISO-SERIES	
ABI Sample Outlier Data	OR_SOF-ISO-SERIES	
Instrument Calibration Data	OR_CAL-ISO-SERIES	
Level 1b Semi-Static Source Data	OR_PARM-L1b-ISO-SERIES	
Level 1b Algorithm Packages	OR_ALG-L1b-ISO-SERIES	

The file extension for ISO series metadata files is ".xml".

The filename for the instrument calibration data ISO series metadata file created at 1:00 PM UTC on January 4, 2015 is:

"OR_CAL-ISO-SERIES_c20140041300000.xml"

6.3   Level 2+ Products and Data

Level 2+ ISO series metadata filenames are assembled using filename string fields as follows:

<DSN>_Version.<File Extension>

The relationship between different ISO series metadata files and the other GOES-R Level 1b products and data files varies as a function of the type of product or data. The relationship between Level 1b product and data files is as follows:

- Each Level 2+ product is associated with a unique ISO series metadata file.
- All of the types of Level 2+ semi-static source data are associated with a shared, but unique ISO series metadata file.
- All of the types of Level 2+ algorithm package files are associated with a shared, but unique ISO series metadata file.

Different ISO series metadata files have unique DSNs. Refer to Table 6.3, Level 2+ ISO Series Metadata DSNs.

Table 6.3   Level 2+ ISO Series Metadata DSNs

Type of Level 2+ Product or Data	ISO Series Metadata DSN	Specific Product
Level 2+ Product	OR_ABI-L2-ACHA-ISO-SERIES	Cloud Top Height
	OR_ABI-L2-ACHT-ISO-SERIES	Cloud Top Temperature
	OR_ABI-L2-ACM-ISO-SERIES	Clear Sky Masks
	OR_ABI-L2-ACTP-ISO-SERIES	Cloud Top Phase
	OR_ABI-L2-ADP-ISO-SERIES	Aerosol Detection
	OR_ABI-L2-AOD-ISO-SERIES	Aerosol Optical Depth
	OR_ABI-L2-CMIP-ISO-SERIES	Cloud & Moisture Imagery
	OR_ABI-L2-COD-ISO-SERIES	Cloud Optical Depth
	OR_ABI-L2-CPS-ISO-SERIES	Cloud Particle Size Distribution
	OR_ABI-L2-CTP-ISO-SERIES	Cloud Top Pressure
	OR_ABI-L2-DMW-ISO-SERIES	Derived Motion Winds
	OR_ABI-L2-DSI-ISO-SERIES	Derived Stability Indices
	OR_ABI-L2-DSR-ISO-SERIES	Downward Shortwave Radiation: Surface
	OR_ABI-L2-FDC-ISO-SERIES	Fire / Hot Spot Characterization
	OR_ABI-L2-FSC-ISO-SERIES	Snow Cover
	OR_ABI-L2-HIE-ISO-SERIES	Hurricane Intensity
	OR_ABI-L2-LST-ISO-SERIES	Land Surface (Skin) Temperature
	OR_ABI-L2-LVMP-ISO-SERIES	Legacy Vertical Moisture Profile
	OR_ABI-L2-LVTP-ISO-SERIES	Legacy Vertical Temperature Profile
	OR_ABI-L2-RRQPE-ISO-SERIES	Rainfall Rate/QPE
	OR_ABI-L2-RSR-ISO-SERIES	Reflected Shortwave Radiation: TOA
	OR_ABI-L2-SST-ISO-SERIES	Sea Surface (Skin) Temperature
	OR_ABI-L2-TPW-ISO-SERIES	Total Precipitable Water
	OR_ABI-L2-VAA-ISO-SERIES	Volcanic Ash: Detection & Height
	OR_GLM-L2-LCFA-ISO-SERIES	Lightning Detection
Level 2+ Semi-Static Source Data	OR_PARM-L2-ISO-SERIES	

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Level 2+ Algorithm Packages	OR_ALG-L2-ISO-SERIES	

The file extension for ISO series metadata files is ".xml", indicating XML files.

The filename for the Total Precipitable Water ISO series metadata file created at 5:05 PM UTC on January 7, 2017 is:

"OR_ABI-L2-TPW-ISO-SERIES_c20170071705000.xml"