



Récents développements VizieR

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□ Le service VizieR



Publication de données d'astronomie attachées à une référence article ou issues d'agences spatiales

- hébergement après publication de l'article (ou concomitante pour A&A)
- flux d'enrichissement des données

Astronomy
&
Astrophysics



Monthly Notices
of the Royal Astronomical Society



~ 24.5K catalogues (+1440 /an)

~ 56K tables

> 10K auteurs

~8.3 M spectres , > 50K images

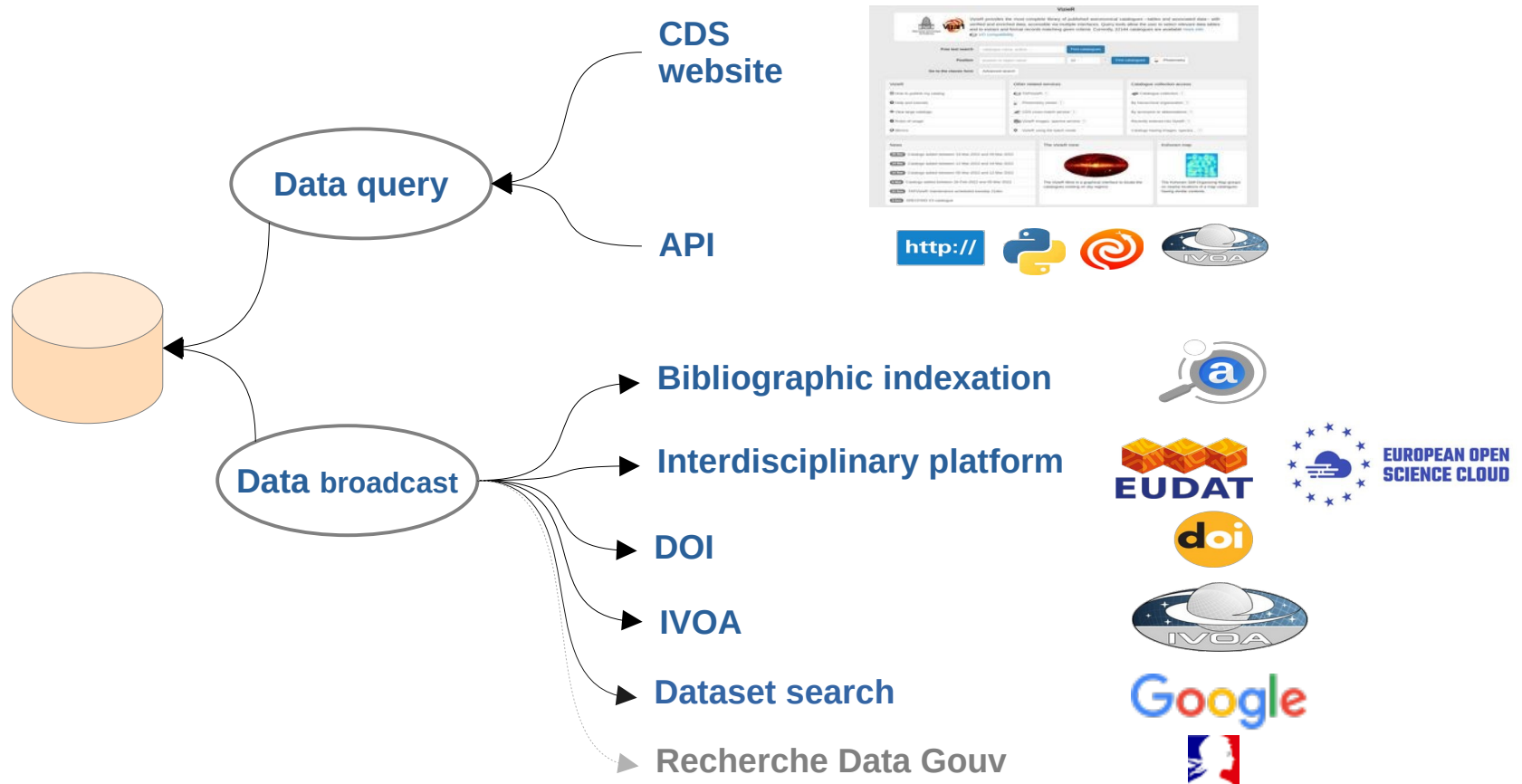
OPEN DATA



□ Réseau de distribution des catalogues

Diffusion des catalogues dans les réseaux de la communauté et dans les réseaux de la Sciences Ouvertes

→ importance du DOI comme identifiant pérenne et unique



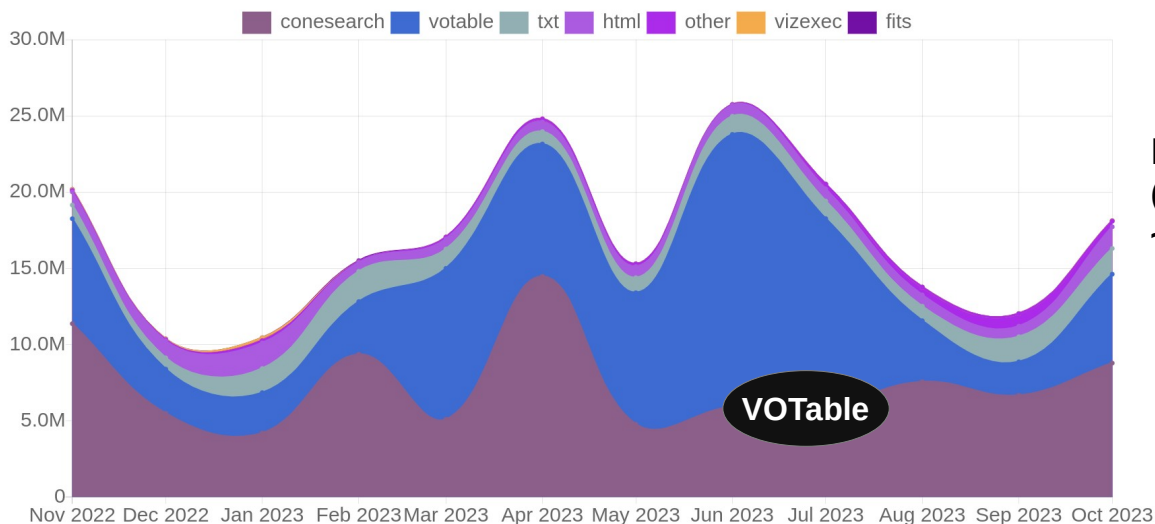


Importance du VO dans la distribution des données



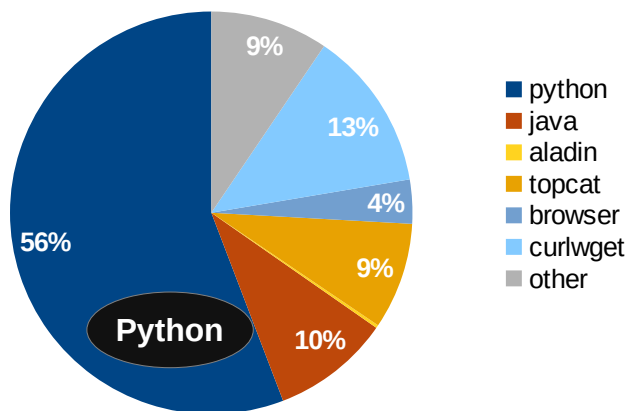
Statistiques d'utilisation VizieR

VizieR queries repartition by output (classic web form and HTTP API)



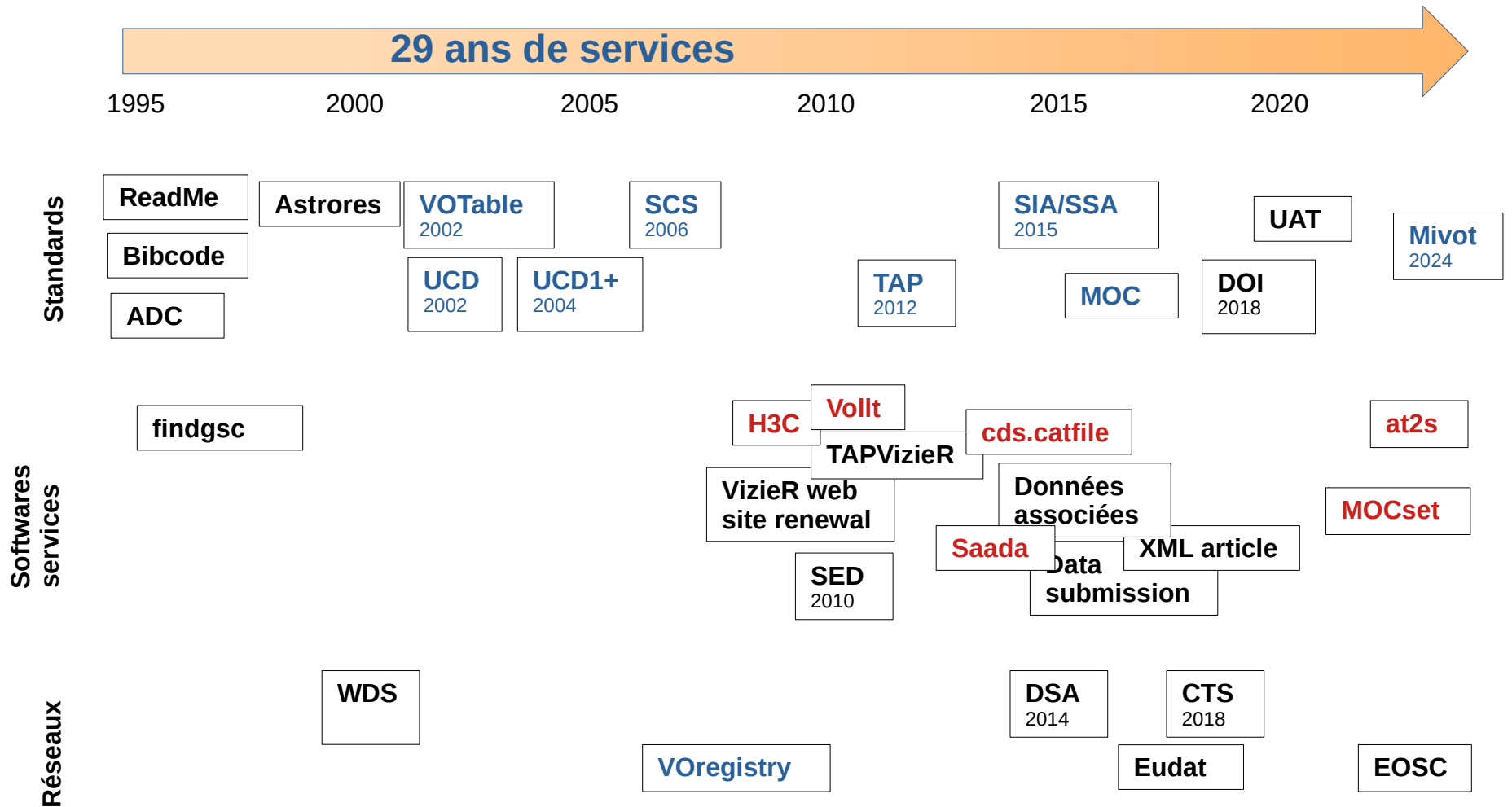
Importance de l'Observatoire Virtuel (conesearch+VOTable) ~86% du total des requêtes

Queries repartition per user-agent



Importance de Python(56%), TOPcat (9-18%), curl+wget (17%)

VizieR évolution



□ Gestion des grandes tables



Nouvelle gestion des grandes tables

- Grandes tables (>30M lignes) sont stockées sous formes de fichier binaire (rcf)
- Migration de logiciel
 - Programme sur mesure (F.Ochsenbein, 1996)
 - Serveur centralisé "cds.catfiles", Java/tomcat (FX.Pineau, 2012)
 - Programme générique basé sur l'architecture at2s (FX.Pineau, 2023)

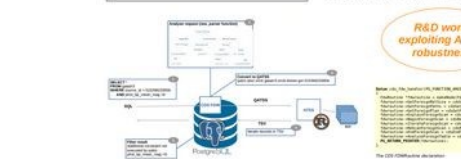
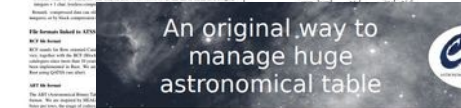
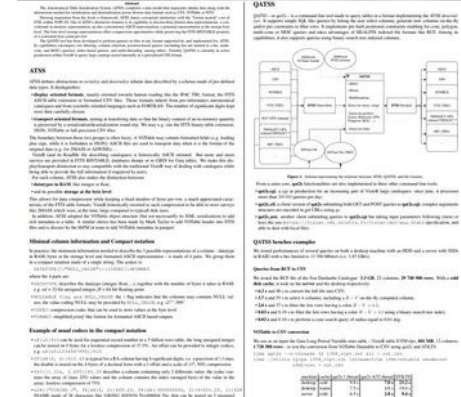
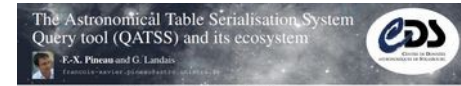
Indexation globale positionnelle par MOC

Service MOC VizieR : <https://cdsarc.cds.unistra.fr/viz-bin/moc?format=html>

Librairie MOCS (Rust) : <https://github.com/cds-astro>

Migration Qbox → Mocs

- Mocset (indexation globale)/ mocli (voir présentation A.Flint ASOV 2023)
- Utilisation intelligente de la mémoire mmap qui s'adapte a la taille mémoire disponible .



The FDW API
The development of a new FDW required a collection of...
The function pointers are expected by PostgreSQL at different stages...
The API allows PostgreSQL to interact with the Query planner by implementing...
Conclusion
The coupling of Foreign Data wrappers and ATSS has been tested. It is an...
CREATE EXTENSION IF NOT EXISTS FOREIGN DATA WRAPPER FDW;
CREATE FOREIGN TABLE at2s (...);
SELECT TOP 10 * FROM at2s WHERE ...;

□ VOTable – Data Origin



DataOrigin dans les sorties VOTable VizieR



Note IVOA “Data Origin in the VO”: <https://www.ivoa.net/documents/DataOrigin/>

- Améliore la reproductibilité : requêtes, URL, date, version, protocole
- Fournit des informations sur l’origines des données: auteurs, dates, identifiants (ivoid, doi),...
- Améliore la citation:(DOI, landing, pages, ...)

Actuellement disponible pour les SCS VizieR et pour les requêtes types ASU

```
-<INFO name="service_protocol" value="ivo://ivoa.net/std/ConeSearch/v1.03">
  IVOID of the protocol through which the data was retrieved
</INFO>
<INFO name="request_date" value="2024-03-08T13:55:28"> Query execution date</INFO>
<INFO name="request" value="https://vizier.cds.unistra.fr/viz-bin/conesearch/J/AJ/161/36?RA=28.4&DEC=39.3&SR=1"> Full request URL</INFO>
<INFO name="contact" value="cds-question@unistra.fr"> Email or URL to contact publisher</INFO>
<INFO name="server_software" value="7.33.2"> Software version</INFO>
<INFO name="publisher" value="CDS"> Data centre that produced the VOTable</INFO>
<!--
Execution Reports
-->
<INFO name="MaxTuples" value="50000"/>
<INFO ID="Target" name="c" value="028.400000+39.300000,rd=1."> Constraint SR=1</INFO>
-<RESOURCE ID="yCat_51610036" name="J/AJ/161/36">
-<DESCRIPTION>
  117 exoplanets in habitable zone with Kepler DR25 (Bryson+, 2021)
</DESCRIPTION>
<INFO name="ivoid" value="ivo://cds.vizieR/j/aj/161/36"> IVOID of underlying data collection </INFO>
<INFO name="creator" value="Bryson S."> First author or institution </INFO>
<INFO name="cites" value="bibcode:2021AJ....161...36B"> Article or Data origin sources </INFO>
<INFO name="editor" value="Astronomical Journal (AAS)"> Editor name (article) </INFO>
<INFO name="original_date" value="2021"> Year of the article publication </INFO>
<INFO name="reference_url" value="https://cdsarc.cds.unistra.fr/viz-bin/cat/J/AJ/161/36"> Dataset landing page </INFO>
-<INFO name="citation" value="doi:10.26093/cds/vizieR:51610036">
  Dataset identifier that can be used for citation
</INFO>
<INFO name="publication_date" value="2022-10-07"> Date of first publication in the data centre </INFO>
<INFO name="rights_uri" value="https://cds.unistra.fr/vizieR-org/licences_vizieR.html"> Licence URI </INFO>
```

Information
de reproductibilité

Provenance des
données



VOTable – Data Origin



The screenshot shows the ALADIN software interface. On the left, a 'Catalog information' window displays a VOTable format for a table. In the center, a 'Properties of the plane "info.xml"' window is open, showing various settings like color, source, and scaling factor. A blue arrow labeled '1' points from the 'Table information' section of the properties window to the 'Table 3/AJ/161/36/table8' section of the VOTable format window.

The screenshot shows the TOPCAT(3) Table Parameters window. It displays a table with columns for Name, Value, and Description. The table contains various parameters for the table '3: AJ_161_36_table8.xml', such as Name, Column Count, Row Count, Description, Ivoid, Publisher, Landing Page, Publication ID, Curation Level, Resource Version, Rights, Creator, Related Resource, Editor, Publication Date, Resource Date, Version, Protocol, Request Date, Request, and Contact.

Name	Value	Description
Name	J/AJ/161/36/table8	Table name
Column Count	19	Number of columns
Row Count	6	Number of rows
Description	Planet candidate properties	
Ivoid	ivo://cds.vizier/j/aj/161/36	
publisher	doi:10.26093/cds.vizier.51610036	
landing_page	https://cdsarc.cds.unistra.fr/viz-bin/cat/J/AJ/161/36	
publication_id	doi:10.26093/cds.vizier.51610036	
curation_level	Research	
resource_version	2022-10-07	
rights	https://cds.unistra.fr/vizier-org/licences_vizier.html	
creator	Bryson S.	
related_resource	2021AJ...161...36B	
editor	Astronomical Journal	
publication_date	2021-03-16	
resource_date	2021	
version	7.294	
protocol	Simple Cone Search 1.03	
request_date	2022-10-30T12:08:00	
request	https://vizier.cds.unistra.fr/viz-bin/conesearch/J/AJ/161/36/...	
contact	cds-question@unistra.fr	

```
>>> from astropy.io import votable
>>> v=votable.parse("https://vizier.cds.unistra.fr/viz-bin/conesearch/J/AJ/163/192?RA=0&DEC=0&SR=1")
Downloading https://vizier.cds.unistra.fr/viz-bin/conesearch/J/AJ/163/192?RA=0&DEC=0&SR=1 [Done]
>>> for info in v.infos:
...     print(info)
...
<INFO ID="protocol" name="protocol" value="Simple Cone Search 1.03"/>
<INFO ID="request_date" name="request_date" value="2023-10-31T15:55:10"/>
<INFO ID="request" name="request" value="https://vizier.cds.unistra.fr/viz-bin/conesearch/J/AJ/163/192?RA=0&DEC=0&SR=1">
<INFO ID="contact" name="contact" value="cds-question@unistra.fr"/>
<INFO ID="version" name="version" value="7.32.5"/>
<INFO ID="MaxTuples" name="MaxTuples" value="50000"/>
<INFO ID="Target" name="-c" value="000.000000+00.000000,rd=1.1"/>
>>> for info in v.resources[0].infos:
...     print(info)
...
<INFO ID="ivoid" name="ivoid" value="ivo://cds.vizier/j/aj/163/192"/>
<INFO ID="publisher" name="publisher" value="CDS"/>
<INFO ID="creator" name="creator" value="Ou J.-Y."/>
<INFO ID="related_resource" name="related_resource" value="bibcode:2022AJ...163...1920"/>
<INFO ID="landing_page" name="landing_page" value="https://cdsarc.cds.unistra.fr/viz-bin/cat/J/AJ/163/192"/>
<INFO ID="publication_id" name="publication_id" value="doi:10.26093/cds.vizier.51630192"/>
<INFO ID="publication_date" name="publication_date" value="2022-09-26"/>
<INFO ID="curation_level" name="curation_level" value="RESEARCH"/>
<INFO ID="rights" name="rights" value="https://cds.unistra.fr/vizier-org/licences_vizier.html"/>
>>>
```



VOTable (Mivot)



La propagation des mouvements sérialisée



- Sérialisation Mivot (<https://www.ivoa.net/documents/MIVOT/> du modèle Mango (pas standard)
 - **“vue” sur la sémantique Coords.**
<https://wiki.ivoa.net/internal/IVOA/InterOpNov2023DM/2023-Mivot-DM-Tuscon.pdf>
 - Met en relation les colonnes de positions avec les colonnes permettant de calculer la propagation :
 - Ra, Dec PmRa, pmDec, Epoch
Mais aussi :
 - Plx, Radial velocity

Exemple: <https://vizier.cds.unistra.fr/viz-bin/beta/mivotconesearch/J/ApJS/254/42?RA=0&DEC=0&SR=1.>

```
-<RESOURCE type="meta">
-<VODML>
  <REPORT status="OK"/>
  <MODEL name="mango"/>
  <MODEL name="ivoa" url="https://www.ivoa.net/xml/VODML/IVOA-v1.vo-dml.xml"/>
-<GLOBALS>
  -<INSTANCE dmttype="coords:SpaceSys" dmid="SpaceFrame_ICRS">
    <ATTRIBUTE dmrole="coords:SpaceFrame.spaceRefFrame" dmttype="coords:SpaceFrame" value="ICRS"/>
  </INSTANCE>
</GLOBALS>
-<TEMPLATES tableref="J/ApJS/254/42/catalog">
  -<INSTANCE dmttype="mango:EpochPosition">
    <ATTRIBUTE dmrole="mango:EpochPosition.longitude" dmttype="ivoa:RealQuantity" ref="RA_ICRS" unit="deg"/>
    <ATTRIBUTE dmrole="mango:EpochPosition.latitude" dmttype="ivoa:RealQuantity" ref="DE_ICRS" unit="deg"/>
    <ATTRIBUTE dmrole="mango:EpochPosition.pmLongitude" dmttype="ivoa:RealQuantity" ref="pmRA" unit="mas/yr"/>
    <ATTRIBUTE dmrole="mango:EpochPosition.pmLatitude" dmttype="ivoa:RealQuantity" ref="pmDE" unit="mas/yr"/>
    <ATTRIBUTE dmrole="mango:EpochPosition.epoch" dmttype="ivoa:RealQuantity" ref="EpochRAgaia" unit="yr"/>
    <REFERENCE dmrole="coords:Coordinate.coordSys" dmref="SpaceFrame_ICRS"/>
  </INSTANCE>
</TEMPLATES>
</VODML>
</RESOURCE>
```

□ VOTable (Mivot)



Utilisation de la sérisation Mivot en utilisant pyvo

En cours d'intégration dans pyvo -

Github: <https://github.com/lmichel/pyvo/tree/v-liter-pr>

Pull request: <https://github.com/astropy/pyvo/pull/497>



Voir présentation
Laurent M.

```
from astropy.io.votable import parse
from pyvo.mivot.viewer.mivot_viewer import MivotViewer

url = "https://vizier.cds.unistra.fr/viz-bin/beta/mivotconesearch//239/hip_main"
votable = parse(f"{url}?RA=000.0009&DEC=01.0890&SR=0.9")
table = votable.resources[0].tables[0]

m_viewer = MivotViewer(votable, resource_number=0)
mivot_object = m_viewer.instance
print(m_viewer.get_models())

for rec in table.array:
    mivot_object.update(rec)
    print(rec)
    print(f"""
lon={mivot_object.longitude.value}
lat={mivot_object.latitude.value}
pmra={mivot_object.pmLongitude.value}
pmdec={mivot_object.pmLatitude.value}
epoch={mivot_object.epoch.value}""")
```

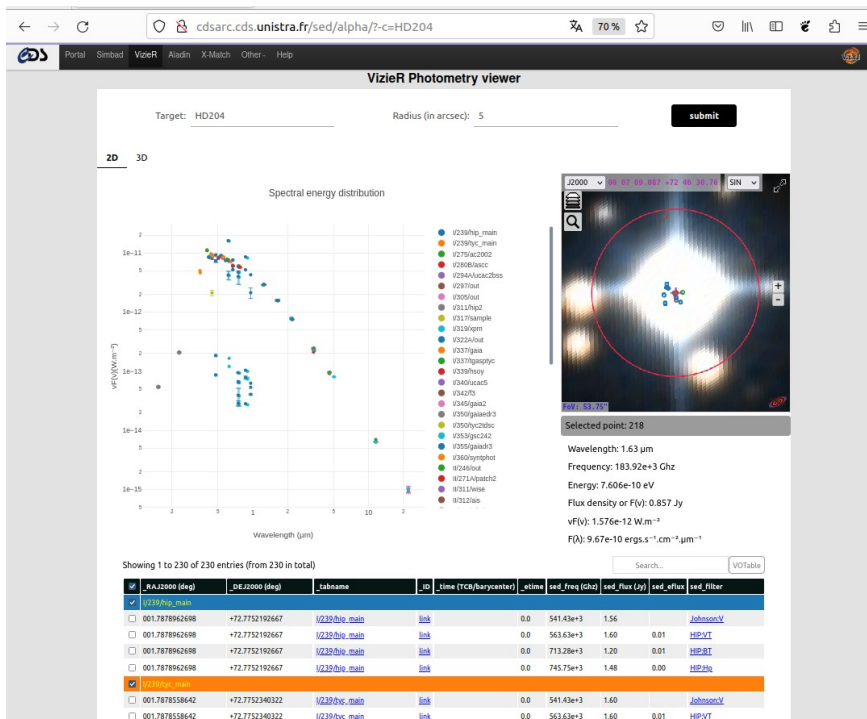
Photometry viewer

Compilation de catalogues VizieR avec des magnitudes

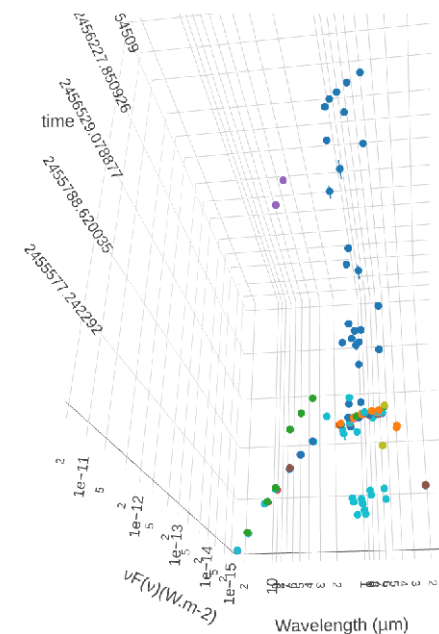
<https://vizier.cds.unistra.fr/sed/>

- Unification de la sortie (Jsky)
- Curation (CDS) des colonnes avec choix de filtres issues d'une base (SpanishVO)
- Sortie VOTable basée sur une note VO photDM (utilisation des utypes)

Technologie (C serveur, angular client)



Staaf: Evguenia Sobine, G.Landais, T.Boch, A.Vanhulle



□ Notebooks



Génération de Jupyter notebooks pour chaque catalogue VizieR

Exemple: <https://cdsarc.cds.unistra.fr/viz-bin/cat/J/AJ/159/60>

Libraries: pyvo (registry, scs, tap) , mocpy , lpyaladin, Matplotlib

Voir présentation
Manon M.

8695 flares from 1228 stars in TESS sectors 1

Access to: VizieR, FTP, ReadMe, TAP, Xmatch, Download notebook

Authors : Gunther M.N. , Zhan Z., Seager S. et..al

VizieR DOI : 10.26093/cds/vizieR.51590060 Cite
Bibcode : 2020AJ...159...60G (ADS) (Simbad) (Objects)

CDS Keywords : Stars, flare; Stars, M-type; Optical; Surveys; Effective temperatures; Stars, diameters; Spectral types
UAT : Stellar flares, M stars, Optical astronomy, Surveys, Effective temperature, Stellar radii, Stellar spectral types

Observation (OC)

Article Origin: Description See also Reac

Stellar flares from the first TESS data release explorir
Go to the original article (10.3847/1538-3881/ab5d3a)

Keywords : Optical flares ; Exoplanets ; Habitable planet
Habitable zone ; Extrasolar rocky planets ; Astrobiology ;

Abstract: We perform a study of stellar flares for the 2480 months of the Transiting Exoplanet Survey Satellite (TESS) impact their habitability, but might also trigger the genesis bright dwarf stars in our galactic neighborhood, collecting exoplanets. Here, we use an automated search for flares code robustly selects the appropriate model for potentially stars, 673 of which are M dwarfs. ...[\(more\)](#)

American Astronomical Society policies

Inserted into VizieR : 22-Apr-2020
Last modification : 01-Jul-2021

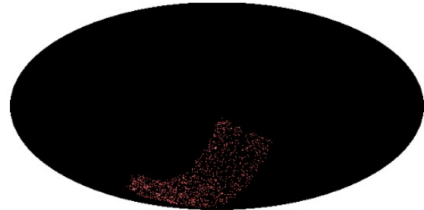
```
[12]: conesearch_records = voresource.get_service("conesearch").search(
      pos=conesearch_center,
      sr=conesearch_radius,
    )
conesearch_records

[12]: <DALResultsTable length=1>
      _r      recno  TIC  Sec  Nout  Nfl  Amp_max  Amp_mean  FWHMdt_max  ...  aFFD  bFFD  Chem  O3cons  O3perm  Dup  SimbadName
      _RA      _DE                                     d  ...
      deg      deg
float64 int32 str9 uint8 int16 int16 float64 float64 float32 ... float32 float32 uint8 uint8 uint8 int32 str23
float64 float64
-----
0.014670 380 160113240 1 4 5 8.12382 1.85419 0.01301 ... -0.547 17.076 0 0 0 0 2MASS J23581533-393534
1 359.56393 -39.59279
```

4. Get the catalogue coverage

VizieR also provides the coverage of each catalogue with Multiple Order Coverage (MOC) at order 10 -- meaning with a 0.001 rad spacial resolution.

```
[13]: # retrieve the MOC
catalogue_coverage = MOC.from_fits(
    f"https://cdsarc.cds.unistra.fr/viz-bin/moc/{CATALOGUE}",
)
catalogue_coverage.display_preview()
```



We can plot the coverage with matplotlib.



□ Autres développements

Interrogation de VizieR en prenant en compte les mouvements propres

Pour les objets à grand mouvement propres (VizieR interroge les catalogues avec des position dans l'époque du catalogue)

- Spécifier les mouvements propres et l'époque: `-c.advanced=ra,dec,epochpmra,pmdec`

https://vizier.cds.unistra.fr/local/viz-bin/VizieR-4?-source=I/239/hip_main&-c.rs=2&-c.advanced=1.28675856,67.8400207,2000,7.13,-7.08&-out.add=_raj,_dej,_r

- Utiliser Sesame (Simbad) pour interroger par nom et en prenant les mouvements propres de Simbad
https://vizier.cds.unistra.fr/viz-bin/VizieR-4?-source=I/239/hip_main&-c.sesame=HD1

Sesame pour les objets solaires

ex: <https://cds.unistra.fr/cgi-bin/nph-sesame/-oX/I/?titan> (XML)

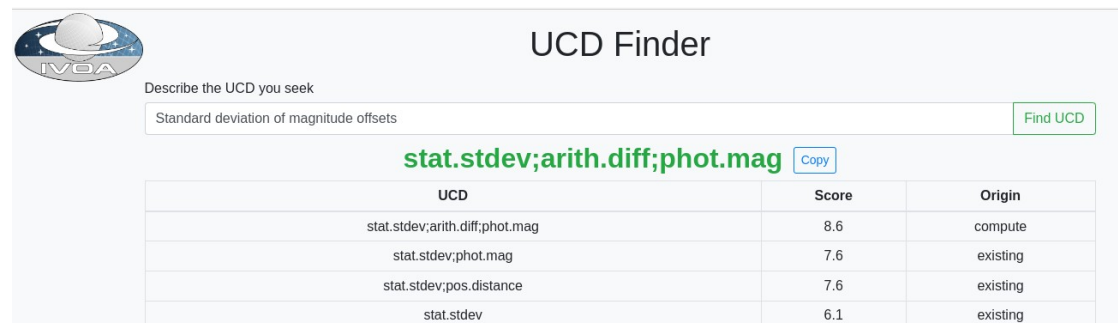


- Ajout du résolveur IMCCE dans le service Sesame
- Disponible dans Aladin

UCD builder

Nouvelle version
(en cours de test dans le workflow VizieR)

<https://cds.unistra.fr/ucd-finder/beta/>



UCD Finder

Describe the UCD you seek

Standard deviation of magnitude offsets

stat.stdev;arith.diff;phot.mag

UCD	Score	Origin
stat.stdev;arith.diff;phot.mag	8.6	compute
stat.stdev;phot.mag	7.6	existing
stat.stdev;pos.distance	7.6	existing
stat.stdev	6.1	existing

Renouvellement du flux d'ingestion des données

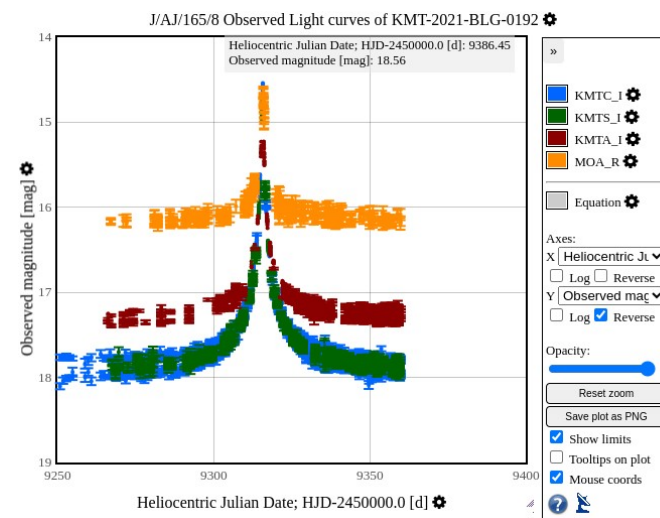
- Evolution technique des processus d'ingestions des tables

Depuis 1995 : sources principalement en C/AWK/SHELL/LaTeX
en développement : **C/C++**, **Python**, Rust , LaTeX/JSON

- Meilleure intégration de VizieR dans le du CDS :
→ Indexation MOC, traitement des grandes volumétries
- Nouvelles métadonnées (sciences ouvertes/ VO)
 - Full workflow in UCD1+
 - ORCID/Affiliation
 - Licences

Mais aussi

- DataLink (IVOA) pour fournir des accès au données associées (série temporelle, SED, spectres)
- Héberger des données avant publication



□ Conclusion



Equipe VizieR

Ingénieurs : G.Landais , F-X-Pineau, M.Marchand, A.Vanhule (← Y.Brossard)

Astronomes : P.Ocvirk, G.Monari, C.Bot, S.Derriere

Documentalistes : P.Vannier, E.Perret, M.Brouty, C.Fix, A.Fialos

Stagiaire : E.Sobine

Mais aussi l'équipe CDS et Laurent !

Stay in touch: (flux rss disponible pour Simbad/vizieR...)

<https://cds.unistra.fr/news/>