



Supplement of

The 30 m annual land cover dataset and its dynamics in China from 1990 to 2019

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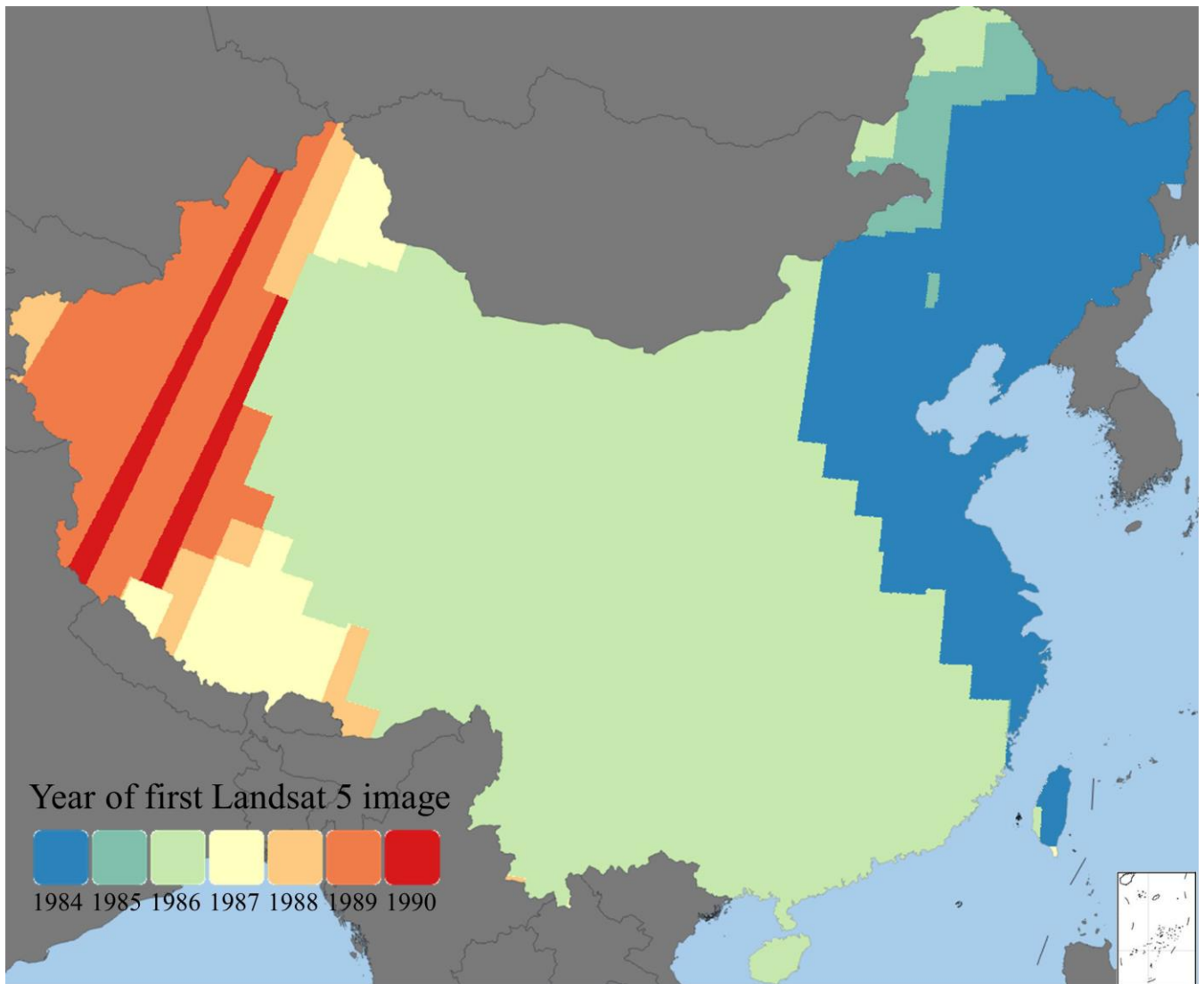


Figure S1. Year of first Landsat 5 image over China.

Table S1. Cross-walking table between different datasets.

Target type		Source type		
CLCD	MCD12Q1 (IGBP)	ESACCI	Geo-Wiki	FROM_GLC
Cropland	Croplands; Cropland / natural vegetation mosaics;	Cropland, rainfed; Cropland, irrigated or post-flooding; Mosaic cropland (>50%) / natural vegetation (tree, shrub, herbaceous cover) (<50%); Mosaic natural vegetation (tree, shrub, herbaceous cover)(>50%/cropland;	Cultivated and Managed; Mosaic: Cultivated and Managed /Natural Vegetation;	Cropland;
Forest	Evergreen needleleaf forests; Evergreen broadleaf forests; Deciduous needleleaf forests; Deciduous broadleaf forests; Mixed forests; Woody savannas; Savannas;	Tree cover, needleleaved, evergreen, closed to open (>15%); Tree cover, needleleaved, deciduous, closed to open (>15%); Tree cover, mixed leaf type (broadleaved and needleleaved); Tree cover, broadleaved, evergreen, closed to open (>15%); Tree cover, broadleaved, deciduous, closed to open (>15%); Mosaic tree and shrub (>50%) / herbaceous cover (<50%); Mosaic herbaceous cover (>50%) / tree and shrub (<50%);	Tree Cover;	Forest;
Shrub	Closed shrublands; Open shrublands;	Shrubland;	Shrub Cover;	Shrubland;
Grassland	Grasslands;	Grassland; Sparse vegetation (tree, shrub, herbaceous cover) (<15%); Lichens and mosses;	Herbaceous Vegetation / Grassland; Grassland;	Grassland;
Water	Water bodies;	Water bodies;	Open Water;	Water;
Snow/Ice	Snow and ice;	Permanent snow and ice;	Snow and Ice;	Snow/Ice;
Barren	Barren;	Bare areas;	Barren;	Bareland;
Impervious	Urban and built-up lands;	Urban areas;	Urban / Built Up;	Impervious surface;
Wetland	Permanent wetlands;	Shrub or herbaceous cover, flooded, fresh/saline/brakish water;	Regularly Flooded / Wetland;	Wetland;
Excluded		Tree cover, flooded, fresh or brakish water; Tree cover, flooded, saline water;		Cloud; Tundra;

Table S2. Land cover transition matrix. logical conversions in the matrix are labeled as "Yes" while illogical conversions are labeled as "No".

		To								
		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	Wetland
From	Cropland	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
	Forest	Yes	Yes	Yes	No	No	No	No	Yes	No
	Shrub	Yes	Yes	Yes	Yes	No	No	No	No	No
	Grassland	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
	Water	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
	Snow/Ice	No	No	No	Yes	Yes	Yes	Yes	No	No
	Barren	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
	Impervious	No	No	No	No	Yes	No	No	Yes	No
	Wetland	Yes	No	Yes	Yes	Yes	No	No	No	Yes

Table S3. Confusion matrix of CLCD in 1985 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
visually-interpreted samples	Cropland	121	13	0	8	0	0	0	4	146	82.88
	Forest	6	121	0	5	0	0	0	0	132	91.67
	Shrub	3	6	5	6	0	0	0	0	20	25.00
	Grassland	13	12	5	153	0	0	14	0	197	77.66
	Water	1	0	0	1	21	0	0	1	24	87.50
	Snow/Ice	0	0	0	0	0	16	1	0	17	94.12
	Barren	1	0	0	67	1	3	127	0	199	63.82
	Impervious	7	0	0	1	0	0	0	17	25	68.00
	SUM	152	152	10	241	22	19	142	22	760	
	PA (%)	79.61	79.61	50.00	63.49	95.45	84.21	89.44	77.27		76.45

Table S4. Confusion matrix of CLCD in 1992 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
visually-interpreted samples	Cropland	146	7	0	17	0	0	2	4	176	82.95
	Forest	7	133	0	6	0	0	0	1	147	90.48
	Shrub	1	8	4	5	0	0	1	0	19	21.05
	Grassland	3	20	4	130	0	3	17	0	177	73.45
	Water	0	0	0	0	15	0	1	0	16	93.75
	Snow/Ice	0	0	0	0	0	6	0	0	6	100.00
	Barren	0	0	0	54	0	2	134	0	190	70.53
	Impervious	11	0	0	0	0	0	0	16	27	59.26
	SUM	168	168	8	212	15	11	155	21	758	
	PA (%)	86.90	79.17	50.00	61.32	100.00	54.55	86.45	76.19		77.04

Table S5. Confusion matrix of CLCD in 1997 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	147	11	1	15	0	0	1	1	176	83.52
	Forest	8	124	2	4	0	0	0	0	138	89.86
	Shrub	2	5	6	2	0	0	1	0	16	37.50
	Grassland	9	13	1	152	0	2	9	0	186	81.72
	Water	1	0	0	1	14	1	0	0	17	82.35
	Snow/Ice	0	0	0	0	0	13	2	0	15	86.67
	Barren	1	0	0	45	1	3	145	1	196	73.98
	Impervious	10	1	0	1	0	0	0	12	24	50.00
	SUM	178	154	10	220	15	19	158	14	768	
	PA (%)	82.58	80.52	60.00	69.09	93.33	68.42	91.77	85.71		79.82

Table S6. Confusion matrix of CLCD in 2002 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	169	8	1	15	1	0	1	4	199	84.92
	Forest	7	153	0	8	0	0	0	0	168	91.07
	Shrub	3	13	8	2	0	0	0	0	26	30.77
	Grassland	10	12	2	130	0	0	7	2	163	79.75
	Water	0	1	0	1	16	0	1	0	19	84.21
	Snow/Ice	0	0	0	0	0	13	1	0	14	92.86
	Barren	0	0	0	46	0	1	152	1	200	76.00
	Impervious	7	1	0	1	0	0	0	28	37	75.68
	SUM	196	188	11	203	17	14	162	35	826	
	PA (%)	86.22	81.38	72.73	64.04	94.12	92.86	93.83	80.00		80.99

Table S7. Confusion matrix of CLCD in 2007 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	136	5	0	8	1	0	0	4	154	88.31
	Forest	14	129	2	6	0	1	0	0	152	84.87
	Shrub	4	9	7	4	0	0	0	0	24	29.17
	Grassland	7	6	1	138	1	1	8	2	164	84.15
	Water	2	0	0	0	13	0	0	0	15	86.67
	Snow/Ice	0	0	0	0	0	11	0	0	11	100.00
	Barren	2	0	0	49	1	0	143	2	197	72.59
	Impervious	12	0	0	1	0	0	0	29	42	69.05
	SUM	177	149	10	206	16	13	151	37	759	
	PA (%)	76.84	86.58	70.00	66.99	81.25	84.62	94.70	78.38		79.84

Table S8. Confusion matrix of CLCD in 2012 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Visually-interpreted samples	Cropland	139	3	0	12	2	0	0	3	159	87.42
	Forest	9	154	0	7	0	0	0	1	171	90.06
	Shrub	3	14	5	3	0	0	0	0	25	20.00
	Grassland	20	7	1	144	0	2	2	0	176	81.82
	Water	1	0	0	0	16	0	0	0	17	94.12
	Snow/Ice	0	0	0	2	0	12	0	0	14	85.71
	Barren	0	0	0	33	1	3	139	0	176	78.98
	Impervious	4	0	0	1	0	0	0	23	28	82.14
	SUM	176	178	6	202	19	17	141	27	766	
	PA (%)	78.98	86.52	83.33	71.29	84.21	70.59	98.58	85.19		82.51

Table S9. Confusion matrix of CLCD in 2017 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	105	14	0	8	1	0	1	0	129	81.40
	Forest	17	162	1	12	0	0	0	0	192	84.38
	Shrub	3	13	3	7	0	0	0	0	26	11.54
	Grassland	10	2	1	135	0	1	6	0	155	87.10
	Water	4	2	0	0	13	0	1	1	21	61.90
	Snow/Ice	0	0	0	1	0	13	1	0	15	86.67
	Barren	1	0	0	53	1	1	196	3	255	76.86
	Impervious	7	1	0	3	0	0	1	21	33	63.64
	SUM	147	194	5	219	15	15	206	25	826	
	PA (%)	71.43	83.51	60.00	61.64	86.67	86.67	95.15	84.00		78.45

Table S10. Confusion matrix of ESACCI_LC in 1992 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	147	10	0	16	0	0	2	1	176	83.52
	Forest	23	117	3	3	1	0	0	0	147	79.59
	Shrub	2	13	0	3	0	0	1	0	19	0.00
	Grassland	29	15	0	117	1	0	14	1	177	66.10
	Water	2	0	0	0	14	0	0	0	16	87.50
	Snow/Ice	0	0	0	0	0	4	2	0	6	66.67
	Barren	0	0	0	60	0	1	129	0	190	67.89
	Impervious	12	0	0	2	1	0	0	12	27	44.44
	SUM	215	155	3	201	17	5	148	14	758	
	PA (%)	68.37	75.48	0.00	58.21	82.35	80.00	87.16	85.71		71.24

Table S11. Confusion matrix of ESACCI_LC in 1997 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Visually-interpreted samples	Cropland	148	9	0	16	1	0	2	0	176	84.09
	Forest	26	102	2	6	2	0	0	0	138	73.91
	Shrub	3	9	0	3	0	0	1	0	16	0.00
	Grassland	29	17	1	122	0	0	17	0	186	65.59
	Water	2	0	0	0	14	1	0	0	17	82.35
	Snow/Ice	0	0	0	1	0	11	3	0	15	73.33
	Barren	5	0	3	62	2	4	120	0	196	61.22
	Impervious	19	0	0	1	0	0	0	4	24	16.67
	SUM	232	137	6	211	19	16	143	4	768	
	PA (%)	63.79	74.45	0.00	57.82	73.68	68.75	83.92	100.00		67.84

Table S12. Confusion matrix of ESACCI_LC in 2002 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Visually-interpreted samples	Cropland	171	6	0	19	0	0	2	1	199	85.93
	Forest	37	124	2	4	1	0	0	0	168	73.81
	Shrub	10	16	0	0	0	0	0	0	26	0.00
	Grassland	29	7	0	116	0	1	10	0	163	71.17
	Water	2	0	0	0	16	0	1	0	19	84.21
	Snow/Ice	0	0	0	2	0	11	1	0	14	78.57
	Barren	3	0	3	62	1	1	130	0	200	65.00
	Impervious	23	0	0	0	0	0	1	13	37	35.14
	SUM	275	153	5	203	18	13	145	14	826	
	PA (%)	62.18	81.05	0.00	57.14	88.89	84.62	89.66	92.86		70.34

Table S13. Confusion matrix of ESACCI_LC in 2007 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Visually-interpreted samples	Cropland	131	6	0	13	0	0	0	4	154	85.06
	Forest	38	104	2	7	1	0	0	0	152	68.42
	Shrub	13	7	1	3	0	0	0	0	24	4.17
	Grassland	28	5	0	124	0	0	7	0	164	75.61
	Water	2	0	0	0	13	0	0	0	15	86.67
	Snow/Ice	0	0	0	0	0	7	4	0	11	63.64
	Barren	4	1	1	69	0	0	122	0	197	61.93
	Impervious	30	0	0	1	0	0	0	11	42	26.19
	SUM	246	123	4	217	14	7	133	15	759	
	PA (%)	53.25	84.55	25.00	57.14	92.86	100.00	91.73	73.33		67.59

Table S14. Confusion matrix of ESACCI_LC in 2012 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Visually-interpreted samples	Cropland	138	2	0	18	1	0	0	0	159	86.79
	Forest	39	122	1	8	0	0	1	0	171	71.35
	Shrub	10	8	0	7	0	0	0	0	25	0.00
	Grassland	28	11	1	131	0	0	5	0	176	74.43
	Water	2	0	0	1	14	0	0	0	17	82.35
	Snow/Ice	0	0	0	1	0	13	0	0	14	92.86
	Barren	1	0	2	49	3	2	119	0	176	67.61
	Impervious	8	0	0	0	0	0	0	20	28	71.43
	SUM	226	143	4	215	18	15	125	20	766	
	PA (%)	61.06	85.31	0.00	60.93	77.78	86.67	95.20	100		72.72

Table S15. Confusion matrix of ESACCI_LC in 2017 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	107	6	0	13	2	0	1	0	129	82.95
	Forest	59	126	0	6	0	0	0	1	192	65.63
	Shrub	8	13	0	5	0	0	0	0	26	0.00
	Grassland	26	4	0	119	0	0	6	0	155	76.77
	Water	3	1	0	3	13	0	1	0	21	61.90
	Snow/Ice	0	0	0	4	0	6	5	0	15	40.00
	Barren	4	1	0	78	1	1	170	0	255	66.67
	Impervious	16	2	0	0	0	0	0	15	33	45.45
	SUM	223	153	0	228	16	7	183	16	826	
	PA (%)	47.98	82.35	0.00	52.19	81.25	85.71	92.90	93.75		67.31

Table S16. Confusion matrix of MCD12Q1 in 2002 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	123	25	0	47	0	0	1	3	199	61.81
	Forest	4	147	0	17	0	0	0	0	168	87.5
	Shrub	2	21	0	3	0	0	0	0	26	0.00
	Grassland	5	10	1	140	0	0	6	1	163	85.89
	Water	1	2	0	1	8	0	7	0	19	42.11
	Snow/Ice	0	0	0	0	0	8	6	0	14	57.14
	Barren	0	1	1	25	0	0	172	1	200	86.00
	Impervious	17	2	0	6	0	0	0	12	37	32.43
	SUM	152	208	2	239	8	8	192	17	826	
	PA (%)	80.92	70.67	0.00	58.58	100.00	100.00	89.58	70.59		73.85

Table S17. Confusion matrix of MCD12Q1 in 2007 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	104	18	0	28	0	0	0	4	154	67.53
	Forest	12	126	1	13	0	0	0	0	152	82.89
	Shrub	1	18	0	5	0	0	0	0	24	0.00
	Grassland	3	7	0	146	0	0	6	2	164	89.02
	Water	1	3	0	0	9	0	2	0	15	60.00
	Snow/Ice	0	0	0	0	0	5	6	0	11	45.45
	Barren	1	2	0	26	0	0	168	0	197	85.28
	Impervious	16	5	0	1	0	0	1	19	42	45.24
	SUM	138	179	1	219	9	5	183	25	759	
	PA (%)	75.36	70.39	0.00	66.67	100.00	100.00	91.80	76.00		76.02

Table S18. Confusion matrix of MCD12Q1 in 2012 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	101	18	0	36	1	0	1	2	159	63.52
	Forest	9	146	0	16	0	0	0	0	171	85.38
	Shrub	2	13	0	10	0	0	0	0	25	0.00
	Grassland	6	16	1	146	0	0	7	0	176	82.95
	Water	0	1	0	1	14	0	1	0	17	82.35
	Snow/Ice	0	0	0	1	0	6	7	0	14	42.86
	Barren	0	0	0	16	0	0	160	0	176	90.91
	Impervious	10	3	0	1	0	0	0	14	28	50.00
	SUM	128	197	1	227	15	6	176	16	766	
	PA (%)	78.91	74.11	0.00	64.32	93.33	100.00	90.91	87.50		76.63

Table S19. Confusion matrix of MCD12Q1 in 2017 based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	88	19	0	17	1	0	1	3	129	68.22
	Forest	14	162	0	15	0	0	0	1	192	84.38
	Shrub	3	16	0	6	0	0	1	0	26	0.00
	Grassland	3	8	0	130	0	0	14	0	155	83.87
	Water	2	7	0	1	7	0	3	1	21	33.33
	Snow/Ice	0	0	0	0	0	4	11	0	15	26.67
	Barren	0	2	1	35	1	0	216	0	255	84.71
	Impervious	11	8	0	3	0	0	0	11	33	33.33
	SUM	121	222	1	207	9	4	246	16	826	
	PA (%)	72.73	72.97	0.00	62.80	77.78	100.00	87.80	68.75		74.82

Table S20. Confusion matrix of CLCD based on Geo-Wiki test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Geo-Wiki samples	Cropland	590	59	0	61	6	0	0	43	759	77.73
	Forest	72	774	8	50	2	1	0	1	908	85.24
	Shrub	38	118	10	177	2	0	10	0	355	2.82
	Grassland	50	83	4	140	2	2	7	2	290	48.28
	Water	3	2	0	2	14	0	0	1	22	63.64
	Snow/Ice	3	2	0	44	7	17	17	0	90	18.89
	Barren	28	25	1	401	2	1	45	2	505	8.91
	Impervious	17	2	0	3	2	0	0	47	71	66.20
	SUM	801	1065	23	878	37	21	79	96	3000	
	PA (%)	73.66	72.68	43.48	15.95	37.84	80.95	56.96	48.96		54.57

Table S21. Confusion matrix of ESACCI_LC based on Geo-Wiki test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC								SUM	UA (%)
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious		
Geo-Wiki samples	Cropland	657	19	0	62	5	0	1	15	759	86.56
	Forest	235	627	9	35	1	0	1	0	908	69.05
	Shrub	107	77	0	167	1	0	2	1	355	0.00
	Grassland	100	48	5	127	2	1	7	0	290	43.79
	Water	4	0	0	2	15	0	1	0	22	68.18
	Snow/Ice	10	3	0	50	2	12	13	0	90	13.33
	Barren	69	19	3	371	2	1	40	0	505	7.92
	Impervious	20	0	0	3	0	0	0	48	71	67.61
	SUM	1202	793	17	817	28	14	65	64	3000	
	PA (%)	54.66	79.07	0.00	15.54	53.57	85.71	61.54	75.00		50.87

Table S22. Confusion matrix of MCD12Q1 based on Geo-Wiki test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1										
Geo-Wiki samples		Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
	Cropland		490	132	0	110	3	0	0	24	759	64.56
	Forest		35	792	3	74	0	0	1	3	908	87.22
	Shrub		23	128	1	192	1	0	10	0	355	0.28
	Grassland		39	82	0	150	3	0	13	3	290	51.72
	Water		2	7	0	3	8	0	1	1	22	36.36
	Snow/Ice		2	3	0	41	1	7	36	0	90	7.78
	Barren		15	23	2	397	0	0	67	1	505	13.27
	Impervious		13	5	0	9	0	0	0	44	71	61.97
	SUM		619	1172	6	976	16	7	128	76	3000	
	PA (%)		79.16	67.58	16.67	15.37	50.00	100.00	52.34	57.89		51.97

Table S23. Confusion matrix of FROM_GLC based on Geo-Wiki test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		FROM_GLC									
	Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Geo-Wiki samples	Cropland	370	142	4	214	11	0	3	15	759	48.75
	Forest	44	740	14	102	2	0	3	3	908	81.50
	Shrub	19	129	5	165	4	0	33	0	355	1.41
	Grassland	35	80	8	131	4	1	29	2	290	45.17
	Water	1	4	0	3	13	0	0	1	22	59.09
	Snow/Ice	4	5	0	26	11	7	37	0	90	7.78
	Barren	10	44	5	261	8	1	176	0	505	34.85
	Impervious	20	4	0	8	3	0	1	35	71	49.30
	SUM	503	1148	36	910	56	9	282	56	3000	
	PA (%)	73.56	64.46	13.89	14.40	23.21	77.78	62.41	62.50		49.23

Table S24. Confusion matrix of CLCD based on GLCVSS test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD									
	Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
GLCVSS samples	Cropland	280	43	1	25	1	0	0	7	357	78.43
	Forest	38	453	1	17	0	0	0	2	511	88.65
	Shrub	2	17	0	48	0	0	13	0	80	0.00
	Grassland	22	47	2	205	0	0	3	3	282	72.70
	Water	7	0	0	1	16	0	1	0	25	64.00
	Snow/Ice	0	0	0	42	1	17	20	0	80	21.25
	Barren	68	6	0	266	4	1	397	3	745	53.29
	Impervious	17	4	0	2	0	0	1	27	51	52.94
	SUM	434	570	4	606	22	18	435	42	2131	
	PA (%)	64.52	79.47	0.00	33.83	72.73	94.44	91.26	64.29		65.46

Table S25. Confusion matrix of ESACCI_LC based on GLCVSS test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		ESACCI LC									
	Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
GLCVSS samples	Cropland	302	27	0	22	0	0	0	6	357	84.59
	Forest	139	349	5	17	0	0	0	1	511	68.30
	Shrub	13	10	2	46	0	0	9	0	80	2.50
	Grassland	61	32	1	175	0	0	12	1	282	62.06
	Water	10	0	0	2	12	0	1	0	25	48.00
	Snow/Ice	6	3	0	55	0	12	4	0	80	15.00
	Barren	88	4	3	299	3	2	346	0	745	46.44
	Impervious	26	3	0	1	0	0	1	20	51	39.22
	SUM	645	428	11	617	15	14	373	28	2131	
	PA (%)	46.82	81.54	18.18	28.36	80.00	85.71	92.76	71.43		57.16

Table S26. Confusion matrix of MCD12Q1 based on GLCVSS test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		MCD12Q1									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
GLCVSS samples	Cropland	210	87	0	49	1	0	0	10	357	58.82
	Forest	43	431	1	32	0	0	0	4	511	84.34
	Shrub	0	10	0	56	0	0	14	0	80	0.00
	Grassland	23	50	1	200	0	0	8	0	282	70.92
	Water	2	8	0	3	8	0	2	2	25	32.00
	Snow/Ice	0	1	0	41	0	8	30	0	80	10.00
	Barren	47	16	1	234	0	3	442	2	745	59.33
	Impervious	15	15	0	5	0	0	1	15	51	29.41
	SUM	340	618	3	620	9	11	497	33	2131	
	PA (%)	61.76	69.74	0.00	32.26	88.89	72.73	88.93	45.45		61.66

Table S27. Confusion matrix of GlobeLand30 based on GLCVSS test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		GlobeLand30									
	Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
	GLCVSS samples	Cropland	283	30	1	32	0	0	1	10	357
Forest		56	395	1	56	0	0	0	3	511	77.30
Shrub		2	14	2	49	0	1	12	0	80	2.50
Grassland		19	34	3	212	0	1	12	1	282	75.18
Water		7	4	1	2	10	0	1	0	25	40.00
Snow/Ice		0	4	0	42	0	15	19	0	80	18.75
Barren		73	8	4	254	0	3	401	2	745	53.83
Impervious		14	6	1	2	0	0	1	27	51	52.94
SUM		454	495	13	649	10	20	447	43	2131	
PA (%)		62.33	79.80	15.38	32.67	100.00	75.00	89.71	62.79		63.12

Table S28. Confusion matrix of CLCD without spatial-temporal filtering based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD without spatial-temporal filtering									
Class		Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	955	62	4	91	5	0	8	14	1139	83.85
	Forest	72	962	9	56	0	0	0	1	1100	87.45
	Shrub	21	65	36	32	0	0	2	0	156	23.08
	Grassland	79	57	16	983	1	9	71	2	1218	80.71
	Water	10	3	0	2	109	1	2	2	129	84.50
	Snow/Ice	0	0	0	2	0	79	5	0	92	85.87
	Barren	5	0	0	351	6	11	1028	5	1413	72.75
	Impervious	62	2	0	9	0	0	1	142	216	65.74
	SUM	1197	1173	62	1510	119	101	1114	176	5463	
	PA (%)	79.78	82.01	58.06	65.10	91.60	78.22	92.28	80.68		78.60

Table S29. Confusion matrix of CLCD with spatial-temporal filtering based on visually-interpreted test samples. PA and UA are abbreviations for the producer's accuracy and user's accuracy, respectively. Bold number represents the overall accuracy.

		CLCD with spatial-temporal filtering									
	Class	Cropland	Forest	Shrub	Grassland	Water	Snow/Ice	Barren	Impervious	SUM	UA (%)
Visually-interpreted samples	Cropland	963	61	2	83	5	0	5	20	1139	84.55
	Forest	68	976	5	48	0	1	0	2	1100	88.73
	Shrub	19	68	38	29	0	0	2	0	156	24.36
	Grassland	72	72	15	982	1	9	63	4	1218	80.62
	Water	9	3	0	3	108	1	3	2	129	83.72
	Snow/Ice	0	0	0	3	0	84	5	0	92	91.30
	Barren	5	0	0	347	5	13	1036	7	1413	73.32
	Impervious	58	3	0	8	0	0	1	146	216	67.59
	SUM	1194	1183	60	1503	119	108	1115	181	5463	
	PA (%)	80.65	82.50	63.33	65.34	90.76	77.78	92.91	80.66		79.31