

Table S1. The summary of the comparison of the claimed global accuracies in global land cover datasets vs the regionally achieved accuracies from different land cover datasets.

Products	Sample numbers	Global overall accuracy	Study	Region	Sample numbers	Overall accuracy
GLC2000	1265	68.5%	Yang et al. [1]	China	--	50.14%
GLCNMO 2008	904	77.9%	Yang et al. [1]	China	--	48.76%
CCI-LC 2010	--	74.4%	Yang et al. [1]	China	--	58.65%
			Sun et al. [2]	the loess Plateau	900	74.2%
GlobCover 2009	--	67.5%	Lu et al. [3]	China	5704	73.49%
GlobeLand30 2010	159874	80.3%	Sun et al. [2]	the loess Plateau	900	86.7%
			Meng et al. [4]	Shaanxi Province	1467	80.0%
			Lu et al. [3]	China	5704	79.61%
			Wang et al. [5]	China	8400	84.2%
			Kang et al. [6]	Indonesia	2189	61.65%
			Jokar Arsanjani et al. [7]	Iran	821	77.9%
			Manakos et al. [8]	Thessaly	>500	77.9%
GLC_FCS30 2015	44043	82.5%	Kang et al. [6]	Indonesia	2232	65.59%
GLASS 2010	12431	82.81%	Sun et al. [2]	the loess Plateau	900	39.4%

Table S2. The precision index values of the products in four phases derived from confusion matrix. (MCC is the Matthews correlation coefficient).

Phase-2000	User's accuracy	Producer's accuracy	Overall accuracy	MCC
GlobeLand30	0.832	0.889	0.901	0.784
CLCD	0.817	0.879	0.891	0.763
CCI-LC	0.771	0.874	0.868	0.719
CLUDs	0.806	0.734	0.849	0.658
GLC2000	0.777	0.658	0.819	0.586
GLASS-GLC	0.706	0.741	0.806	0.574
GLCNMO-2003	0.634	0.694	0.759	0.477
GlobCover-2005	0.618	0.566	0.732	0.393
Phase-2010	User's accuracy	Producer's accuracy	Overall accuracy	MCC

CLCD	0.836	0.891	0.903	0.788
GlobeLand30	0.841	0.859	0.896	0.770
CCI-LC	0.793	0.847	0.872	0.721
CLUDs	0.794	0.705	0.836	0.628
GLASS-GLC	0.765	0.711	0.826	0.608
GLCNMO-2008	0.712	0.733	0.806	0.573
GlobCover-2009	0.629	0.584	0.740	0.411
GlobCover-2005	0.620	0.577	0.733	0.399

Phase-2015	User's accuracy	Producer's accuracy	Overall accuracy	MCC
CLCD	0.863	0.859	0.899	0.781
CCI-LC	0.809	0.828	0.866	0.712
GLC_FCS30	0.745	0.906	0.852	0.704
FROM-GLC-2017	0.826	0.735	0.847	0.664
CLUDs	0.847	0.701	0.844	0.658
FAO-GLCshare-2014	0.679	0.914	0.811	0.640
CGLS-LC100	0.638	0.974	0.789	0.636
GLASS-GLC	0.748	0.694	0.803	0.569
GLCNMO-2013	0.627	0.899	0.767	0.569

Phase-2020	User's accuracy	Producer's accuracy	Overall accuracy	MCC
CLCD-2019	0.898	0.871	0.915	0.817
GlobeLand30	0.905	0.836	0.906	0.797
GLC_FCS30	0.874	0.864	0.902	0.791
Esri	0.885	0.831	0.896	0.777
CLUDs	0.831	0.685	0.829	0.629
CGLS-LC100-2019	0.566	0.984	0.710	0.539

Table S3. Numbers of the commission and omission error in each product in Phase-2015 and Phase-2020.

Phase-2015 Numbers	GLCNMO -2013	CGLS- LC100	GLASS	FAO-GLC share-2014	CLUDs	FROM -2017	GLC_ FCS30	CCI-LC	CLCD- 2019
Commission error	392	404	171	316	93	113	227	143	100
Omission error	74	19	224	63	219	194	69	126	103
total	466	423	395	379	312	307	296	269	203

Phase-2020 Numbers	CGLS-LC100 -2019	CLUDs	Esri	GLC_FCS30	GlobeLand30	CLCD-2019
Commission error	568	105	81	94	66	74
Omission error	12	237	127	102	123	97
total	580	342	208	196	189	171

Table S4. The area proportion of different agreement levels. P1 represents only one product identifies the pixel as cropland, P9 represents all nine products identify the pixel as cropland. The sum proportion of P1-P9 in each is 1.

Phase	P1	P2	P3	P4	P5	P6	P7	P8	P9
2015	0.132	0.116	0.096	0.078	0.072	0.075	0.093	0.141	0.197
2020	0.295	0.111	0.086	0.086	0.137	0.285			

Table S5. The Definition and classification of cropland for each data in this article.

Dataset	Classes	Description
GLASS-GLC	10. Cropland	Rice paddy; Greenhouse; Other farmland; Orchard; Bare farmland.
GLC2000	21. Farmland	Cropland (upland crops or inundated/flooded crops as e.g., rice).
FAO-GLC share	2 Cropland	Herbaceous crops; Woody crops; Multiple or layered crops. For a detailed explanation, see the website: Crop land - GLC-SHARE - Datasets - "FAO catalog" .
CLUDs	1. cropland	Land used for agriculture, orchard and beach, including irrigated and dry farmland, newly opened land, fruit, mulberry and forestry of agricultural, sea shoals of cultivated for more than three years, etc.
GLCNMO	11. Cropland 12. Paddy field 13. Cropland/ other vegetation	Cropland: herbaceous crop(s); Paddy field: graminoid crops//non-graminoid crops; Cropland/other vegetation: cultivated and managed terrestrial area(s)/natural and semi-natural primarily terrestrial vegetation//cultivated aquatic or regularly flooded Area(s)/natural and semi-natural primarily terrestrial vegetation.
CCI-LC	10. Cropland, rainfed; 11. Herbaceous cover; 12. Tree or shrub cover; 20. Cropland, irrigated or post-flooding; 30. Mosaic cropland (>50%)/natural vegetation (tree, shrub, herbaceous cover) (<50%)	
GlobCover	11. Post-flooding or irrigated croplands (or aquatic). 14. Rainfed croplands. 20. Mosaic cropland (50-70%)/vegetation (grassland/shrubland/forest) (20-50%).	11. Post-flooding or irrigated shrubs, tree crops, and herbaceous crops. 14. Rainfed herbaceous, shrub, or tree crops (cash crops, vineyards, olive trees, orchards). 20. Cultivated and managed terrestrial areas with primarily natural and semi-natural terrestrial vegetation.
CGLS-LC100	Crops	Cultivated and managed vegetation/agriculture (cropland): lands covered with temporary crops followed by harvest and a bare soil period (e.g., single and multiple cropping systems). Note that perennial woody crops will be classified as the appropriate forest or shrub land cover type.
GlobeLand30	10. Cropland	Land used for agriculture, horticulture and gardens, including paddy fields, irrigated and dry farmland, vegetable and fruit gardens, etc.

CLCD	1. Cropland	Cropland (paddy rice, greenhouse, others), orchard, managed grasslands, temporally bare croplands.
GLC_FCS30	10. Rainfed/irrigated cropland; 11. Herbaceous cover; 12. Tree or shrub cover (orchard); 20. Irrigated cropland.	
FROM-GLC	1. Cropland	Cropland (paddy rice, greenhouse, others), orchard, managed grasslands, temporally bare croplands.
Esri	5. Crops	Human planted/plotted cereals, grasses, and crops not at tree height; Examples: corn, wheat, soy, fallow plots of structured land.

Table S6. The following is the confusion matrix of each data in the four periods.

Phrase-2000

GLASS-GLC		product		total
		cropland	non-cropland	
ground	cropland	507	177	684
“truth” value	non-cropland	211	1105	1316
	total	718	1282	2000

GLC2000		product		total
		cropland	non-cropland	
ground	cropland	450	234	684
“truth” value	non-cropland	129	1187	1316
	total	679	1411	2000

CLUDs		product		total
		cropland	non-cropland	
ground	cropland	502	182	684
“truth” value	non-cropland	121	1195	1316
	total	623	1277	2000

GLCNMO-2003		product		total
		cropland	non-cropland	
ground	cropland	475	209	684
“truth” value	non-cropland	274	1042	1316
	total	749	1251	2000

CCI-LC		product		total
		cropland	non-cropland	
ground	cropland	598	86	684
“truth” value	non-cropland	178	1138	1316
	total	776	1224	2000

GlobeLand30		product		total
		cropland	non-cropland	
ground	cropland	608	76	684
“truth” value	non-cropland	123	1193	1316

total	731	1269	2000
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CLCD		product		
		cropland	non-cropland	total
ground	cropland	601	83	684
“truth” value	non-cropland	135	1181	1316
	total	736	1264	2000

GlobCover-2005		product		
		cropland	non-cropland	total
ground	cropland	387	297	684
“truth” value	non-cropland	239	1077	1316
	total	626	1374	2000

Phrase-2010

GLASS-GLC		product		
		cropland	non-cropland	total
ground	cropland	489	199	688
“truth” value	non-cropland	150	1162	1312
	total	639	1361	2000

CLUDs		product		
		cropland	non-cropland	total
ground	cropland	485	203	688
“truth” value	non-cropland	126	1186	1312
	total	736	1264	2000

GLCNMO-2008		product		
		cropland	non-cropland	total
ground	cropland	504	184	688
“truth” value	non-cropland	204	1108	1312
	total	708	1292	2000

GlobCover-2009		product		
		cropland	non-cropland	total
ground	cropland	402	286	688
“truth” value	non-cropland	237	1075	1312
	total	639	1361	2000

CCI-LC		product		
		cropland	non-cropland	total
ground	cropland	583	105	688
“truth” value	non-cropland	152	1160	1312
	total	737	1265	2000

GlobeLand30		product		
		cropland	non-cropland	total
ground	cropland	591	97	688
“truth” value	non-cropland	112	1200	1312

	total	703	1297	2000
CLCD		product		
		cropland	non-cropland	total
ground	cropland	613	75	688
“truth” value	non-cropland	120	1192	1312
	total	733	1267	2000

GlobCover-2005		product		
		cropland	non-cropland	total
ground	cropland	397	291	688
“truth” value	non-cropland	243	1069	1312
	total	640	1360	2000

Phrase-2015

GLASS-GLC		product		
		cropland	non-cropland	total
ground	cropland	508	224	732
“truth” value	non-cropland	171	1097	1268
	total	679	1321	2000

FAO-GLCshare		product		
		cropland	non-cropland	total
ground	cropland	669	63	732
“truth” value	non-cropland	316	952	1268
	total	985	1015	2000

CLUDs		product		
		cropland	non-cropland	total
ground	cropland	513	219	732
“truth” value	non-cropland	93	1175	1268
	total	606	1394	2000

GLCNMO		product		
		cropland	non-cropland	total
ground	cropland	658	74	732
“truth” value	non-cropland	392	876	1268
	total	1050	950	2000

CCI-LC		product		
		cropland	non-cropland	total
ground	cropland	606	126	732
“truth” value	non-cropland	143	1125	1268
	total	749	1251	2000

CGLS-LC100		product		
		cropland	non-cropland	total
ground	cropland	713	19	732
“truth” value	non-cropland	404	864	1268
	total	1117	883	2000

CLCD		product		
		cropland	non-cropland	total
ground	cropland	629	103	732
“truth” value	non-cropland	100	1168	1268
	total	729	1271	2000

GLC_FCS30		product		
		cropland	non-cropland	total
ground	cropland	663	69	732
“truth” value	non-cropland	227	1041	1268
	total	890	1110	2000

FROM-2017		product		
		cropland	non-cropland	total
ground	cropland	538	194	732
“truth” value	non-cropland	113	1155	1268
	total	651	1349	2000

Phrase-2020

GlobeLand30		product		
		cropland	non-cropland	total
ground	cropland	629	123	752
“truth” value	non-cropland	66	1182	1248
	total	695	1305	2000

CLUDs		product		
		cropland	non-cropland	total
ground	cropland	515	237	752
“truth” value	non-cropland	105	1143	1248
	total	620	1380	2000

CGLS-LC100		product		
		cropland	non-cropland	total
ground	cropland	740	12	752
“truth” value	non-cropland	568	680	1248
	total	1308	1692	2000

CLCD		product		
		cropland	non-cropland	total
ground	cropland	655	97	752
“truth” value	non-cropland	74	1174	1248
	total	729	1271	2000

Esri		product		
		cropland	non-cropland	total
ground	cropland	625	127	752
“truth” value	non-cropland	81	1167	1248
	total	706	1294	2000

GLC_FCS30 product

		cropland	non-cropland	total
ground “truth” value	cropland	650	102	752
	non-cropland	94	1154	1248
	total	744	1256	2000

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