

**Table S1.** The classification system used in this paper.

	CCI-LC	UN-LCCS	IGBP	FROM-GLC
<b>Cropland</b>	10 Cropland, rainfed			
	20 Cropland, irrigated or post-flooding 30	40 Cultivated and managed vegetation/agriculture (cropland)	10 Croplands 13	11 Rice paddy 12 Greenhouse 13
	Mosaic cropland (>50%)/natural vegetation (tree, shrub, herbaceous cover) (<50%)		Cropland/natural vegetation mosaics	Other cropland 14 Orchard 15 Bare farmland
		111 Closed (>70%) evergreen needle leaf 112 Closed to open (>70%)		
	50 Tree cover, broadleaved, evergreen, closed to open (>15%) 60 Tree cover, broadleaved, deciduous, closed to open (>15%) 70 Tree cover, needle-leaved, evergreen, closed to open (>15%) 80 Tree cover, needle-leaved, deciduous, closed to open (>15%) 90 Tree cover, mixed leaf type (broadleaved and needle-leaved)	evergreen, broadleaf 113 Closed (>70%) deciduous needle leaf 114 Closed (>70%) deciduous broadleaf 115 Closed forest, mixed 116 Closed forest, unknown 121 Open (15–70%) evergreen needle leaf 122 Open (15–70%) evergreen broadleaf 123 Open (15–70%) deciduous needle-leaf 124 Open (15–70%) deciduous broadleaf 125 Open forest, mixed 126 Open forest, unknown	20 Woody savannas 21 Evergreen broadleaf forests 22 Deciduous broadleaf forests 23 Evergreen needle-leaf forests 24 Deciduous needle-leaf forests 25 Mixed forests	21 Broadleaf, leaf-on 22 Broadleaf, leaf-off 23 Needle-leaf, leaf-on 24 Needle-leaf, leaf-off 25 Mixed leaf, leaf-on 26 Mixed leaf, leaf-off
<b>Forest</b>	110 Mosaic herbaceous cover (>50%)/tree and shrub (<50%) 130 Grassland	30 Herbaceous vegetation (tree and shrub coverage <10%)	30 Grasslands	31 Pasture 32 Natural grassland 33 Grassland, leaf-off
<b>Shrubland</b>	120 Shrubland	20 Shrubs (perennial woody plant without		

		clear main stem, height <5 m)	40 Closed/open shrublands, savanna	41 Shrubland, leaf-on 42 Shrubland, leaf-off
<b>Water</b>	210 Water bodies	80 Permanent water bodies 200 Open sea	50 Water bodies	60 Water
<b>Urban/Built up</b>	190 Urban areas	50 Urban/built up	60 Urban and built-up lands	80 Impervious surface
<b>Bare land</b>	200 Bare areas 150 Sparse vegetation (tree, shrub, herbaceous cover) (<15%)	60 Bare/sparse vegetation (tree coverage <10%)	70 Barren sparse vegetation	90 Bareland
<b>Permanent snow and ice</b>	220 Permanent snow and ice	70 Snow and ice	80 Permanent snow and ice	101 Snow 102 Ice
<b>Wetland</b>	160 Tree cover, flooded, fresh or brackish water 170	90 Herbaceous wetland	100 Permanent wetlands	51 Marshland 52 Mudflat 53 Marshland, leaf-off

Tree cover, flooded,  
saline water 180  
Shrub or herbaceous  
cover, flooded,  
fresh/saline/  
brackish water

**Table S2.** Validation point confusion matrix for CCI-LC

Class	Cropland	Forest	Grassland	Shrubland	Water	Urban/Built up	Bare land	Permanent snow and ice	Wetland	Total	PA	OA	Kappa
Cropland	247	25	12	2	4	61	1	0	3	355	69.58%	68.41%	0.60
Forest	104	408	28	0	3	7	0	0	15	565	72.21%		
Grassland	20	10	106	15	0	2	0	0	2	155	68.39%		
Shrubland	10	6	12	46	0	0	0	0	2	76	60.53%		
Water	9	1	5	0	60	7	1	0	3	86	69.77%		
Urban/Built up	19	1	5	0	4	71	0	0	0	100	71.00%		
Bare land	6	3	6	0	2	3	34	8	0	62	54.84%		
Permanent snow and ice	1	2	24	0	0	0	4	26	0	57	45.61%		
Wetland	5	5	2	1	5	0	0	0	33	51	64.71%		
Total	421	461	200	64	78	151	40	34	58	1507			
UA	58.67%	88.50%	53.00%	71.88%	76.92%	47.02%	85.00%	76.47%	56.90%				

**Table S3.** Validation point confusion matrix for CGLS

Class	Cropland	Forest	Grassland	Shrubland	Water	Urban/Built up	Bare land	Permanent snow and ice	Wetland	Total	PA	OA	Kappa
Cropland	271	60	3	0	4	12	0	0	5	355	76.34%	74.05%	0.66
Forest	100	457	2	1	0	4	0	0	1	565	80.88%		
Grassland	21	32	94	1	1	6	0	0	0	155	60.65%		
Shrubland	5	22	2	46	0	1	0	0	0	76	60.53%		
Water	12	2	2	1	61	8	0	0	0	86	70.93%		
Urban/Built up	15	11	0	1	1	72	0	0	0	100	72.00%		
Bare land	3	2	9	3	1	2	41	1	0	62	66.13%		
Permanent snow and ice	0	0	3	1	0	0	13	40	0	57	70.18%		
Wetland	7	7	0	1	2	0	0	0	34	51	66.67%		
Total	434	593	115	55	70	105	54	41	40	1507			
UA	62.44%	77.07%	81.74%	83.64%	87.14%	68.57%	75.93%	97.56%	85.00%				

**Table S4.** Validation point confusion matrix for FROM-GLC

Class	Cropland	Forest	Grassland	Shrubland	Water	Urban/Built up	Bare land	Permanent snow and ice	Wetland	Total	PA	OA	Kappa
Cropland	197	78	51	4	11	8	0	0	6	355	55.49%	65.56%	0.56
Forest	82	406	49	19	3	5	1	0	0	565	71.86%		
Grassland	12	12	108	8	1	1	2	8	3	155	69.68%		
Shrubland	6	13	13	44	0	0	0	0	0	76	57.89%		
Water	6	4	1	0	62	12	1	0	0	86	72.09%		
Urban/Built up	13	1	14	0	3	66	3	0	0	100	66.00%		
Bare land	2	2	10	0	5	1	40	1	1	62	64.52%		

Permanent snow and ice	0	1	2	0	8	0	12	34	0	57	59.65%
Wetland	6	4	1	0	9	0	0	0	31	51	60.78%
Total	324	521	249	75	102	93	59	43	41	1507	
UA	60.80%	77.93%	43.37%	58.67%	60.78%	70.97%	67.80%	79.07%	75.61%		

**Table S5.** Validation point confusion matrix for MCD12Q1

Class	Cropland	Forest	Grassland	Shrubland	Water	Urban/Built up	Bare land	Permanent snow and ice	Wetland	Total	PA	OA	Kappa
Cropland	250	40	45	0	2	9	1	0	8	355	70.42%	61.63%	0.52
Forest	90	325	101	32	3	0	0	0	14	565	57.52%		
Grassland	10	33	97	0	1	4	0	9	1	155	62.58%		
Shrubland	4	25	5	42	0	0	0	0	0	76	55.26%		
Water	3	12	4	0	53	7	1	0	6	86	61.63%		
Urban/Built up	9	15	5	0	1	69	0	0	1	100	69.00%		
Bare land	5	4	16	1	2	3	31	0	0	62	50.00%		
Permanent snow and ice	0	0	5	0	0	0	16	36	0	57	63.16%		
Wetland	5	11	6	2	2	0	0	0	27	53	50.94%		
Total	376	465	284	77	64	92	49	45	57	1509			
UA	66.49%	69.89%	34.15%	54.55%	82.81%	75.00%	63.27%	80.00%	47.37%				

**Table S6.** Confusion matrix for GFSAD30 assessment result

Class	Cropland	No-Cropland	Total	PA	OA	Kappa
Cropland	265	90	355	74.65%	77.90%	0.47
No-Cropland	243	909	1152	78.91%		
Total	508	999	1507			
UA	52.17%	90.99%				

**Table S7.** Confusion matrix for PLASAR assessment result

Class	Forest	No-Forest	Total	PA	OA	Kappa
Forest	372	193	565	65.84%	73.32%	0.43
No-Forest	209	733	942	77.81%		
Total	581	926	1507			
UA	64.03%	79.16%				

**Table S8.** Confusion matrix for GWSD assessment result

Class	Water	No-Water	Total	PA	OA	Kappa
Water	68	18	86	79.07%	95.62%	0.65
No-Water	48	1373	1421	96.62%		
Total	116	1391	1507			
UA	58.62%	98.71%				

**Table S9.** Confusion matrix for GHS-BUILT assessment result

Class	Urban	No-Urban	Total	PA	OA	Kappa
Urban	74	26	100	74.00%	82.95%	0.29
No-Urban	231	1176	1407	83.58%		
Total	305	1202	1507			
UA	24.26%	97.84%				

**Table S10.** Confusion matrix for cropland correction results

Class	Cropland	No-Cropland	Total	PA	OA	Kappa
Cropland	307	48	355	86.48%	92.50%	0.80
No-Cropland	65	1087	1152	94.36%		
Total	372	1135	1507			
UA	82.53%	95.77%				

**Table S11.** Confusion matrix for forest correction results

Class	Forest	No-Forest	Total	PA	OA	Kappa
Forest	517	48	565	91.50%	94.03%	0.87
No-Forest	42	900	942	95.54%		
Total	559	948	1507			
UA	92.49%	94.94%				

**Table S12.** Confusion matrix for water correction results

Class	Water	No-Water	Total	PA	OA	Kappa
Water	75	11	86	87.21%	98.61%	0.87
No-Water	10	1411	1421	99.30%		
Total	85	1422	1507			
UA	88.24%	99.23%				

**Table S13.** Confusion matrix for urban / built up correction results

Class	Urban/Built up	No-Urban/built up	Total	PA	OA	Kappa
Urban/Built up	82	18	100	82.00%	98.21%	0.85
No-Urban/Built up	9	1398	1407	99.36%		
Total	91	1416	1507			
UA	90.11%	98.73%				