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Supplementary Information for

Mapping 10-m global impervious surface area (GISA-10m) using multi-source geospatial data

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Fig.S1. Global distribution of urban ecoregions and 30 randomly selected grids.

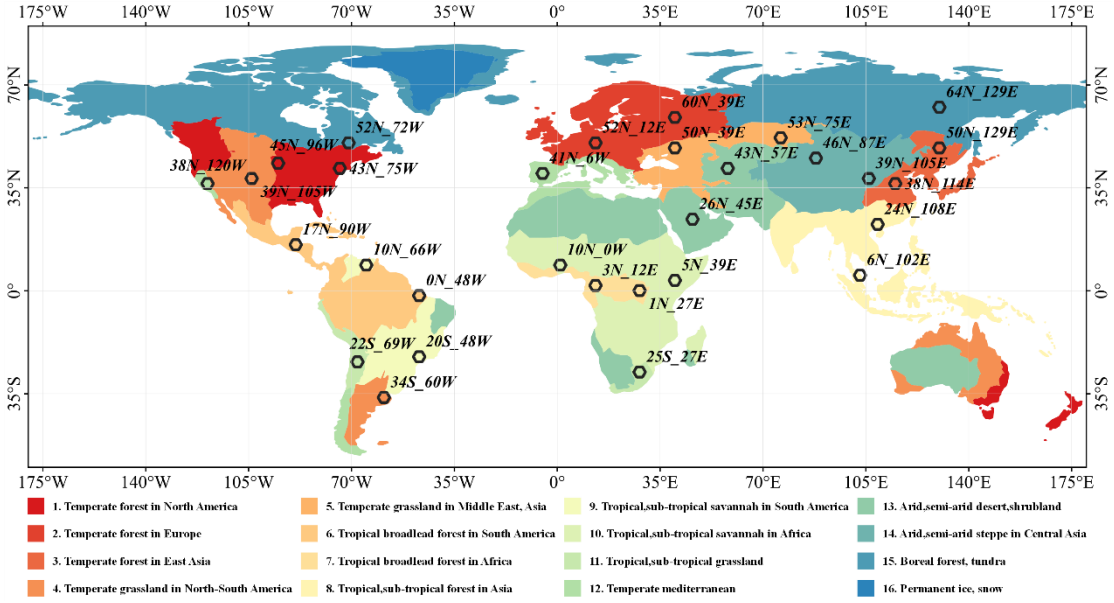

Fig.S2. Global distribution of (a) Sentienl-1 and (b) Sentinle-2 images for 2016.

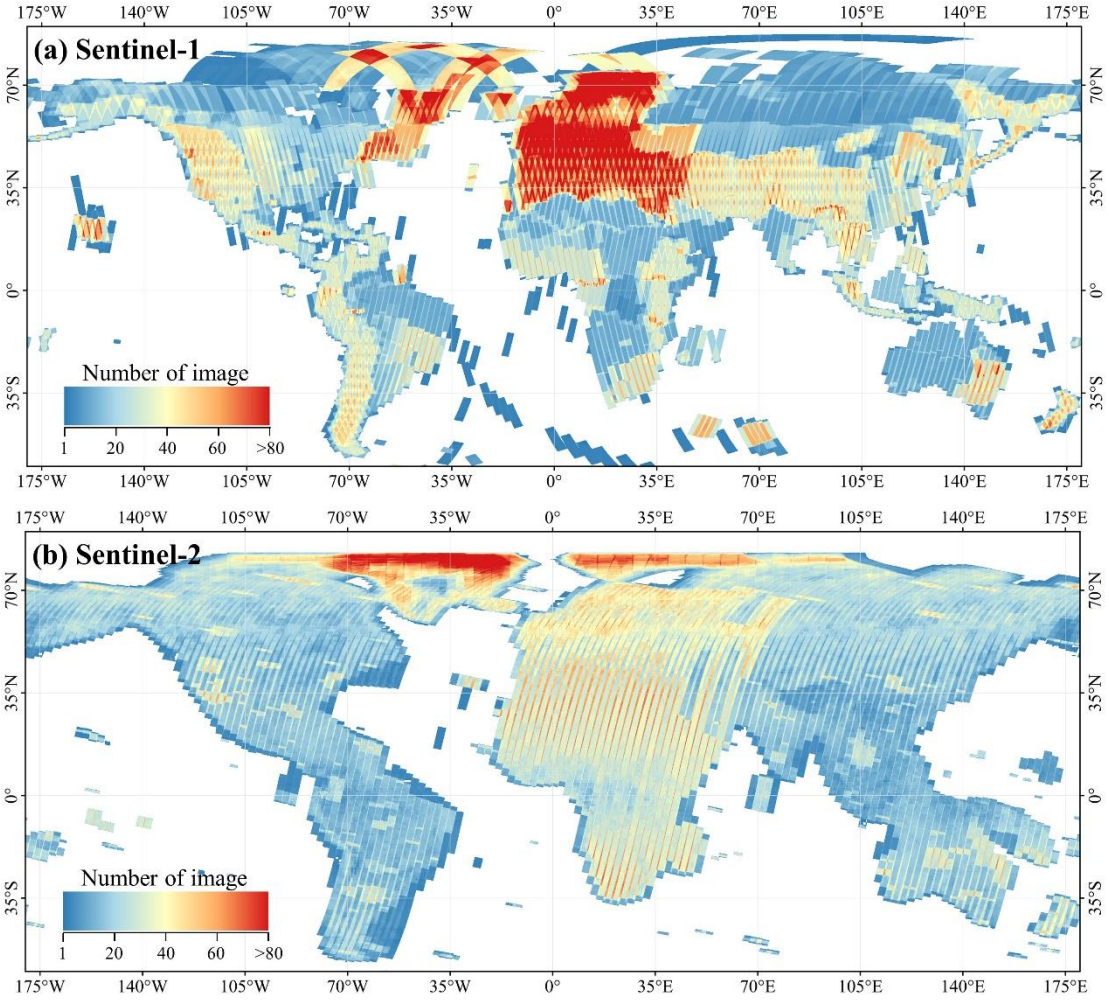

Fig.S3. Box plots of the overall accuracy for GISA-10m in the six continents by using (a) ISA_{RS} and (b) ISA_{OSM}.

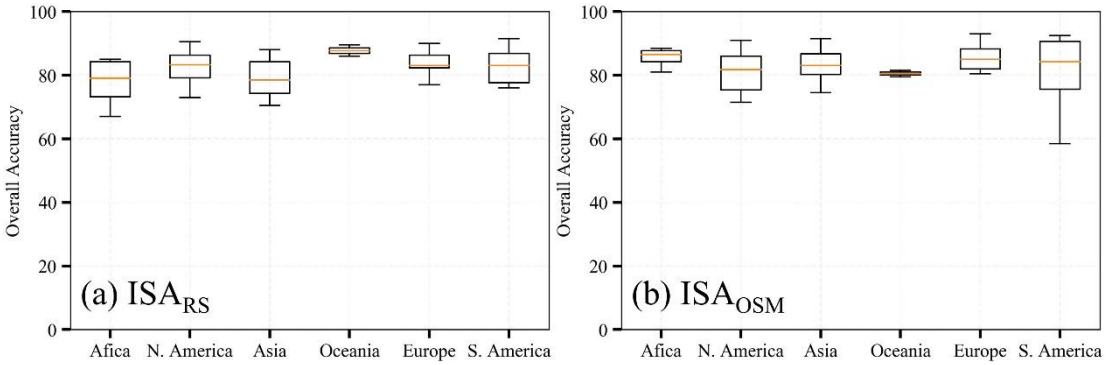

Table S1. Results of quantitative accuracy assessment via visually-interpreted and ZY-3 samples between GISA-10m and the existing ISA datasets. UA denotes the user's accuracy while PA means producer's accuracy.

Globe	Visually interpreted samples (n=10800)				ZY-3 samples (n=68368)			
	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)
GISA-10m	86.13	81.30	86.01	91.25	81.87	71.35	87.87	92.92
GHSL2018	90.20	69.74	79.96	95.14	74.44	76.12	89.19	88.29
GLCFCS	88.40	69.11	79.30	93.85	77.96	69.84	87.09	91.15
WSF2015	89.00	72.13	81.00	94.11	74.55	80.36	90.88	87.71
FROM_GLC10	89.35	57.07	73.98	95.55	75.83	69.25	86.74	90.11
GISA	90.97	57.75	74.34	96.24	77.09	76.21	89.40	89.86
GAUD	92.18	53.19	72.53	97.05	79.16	72.53	88.14	91.45
GAIA	90.78	53.25	72.48	96.47	72.89	78.06	89.85	86.99

Table S2. Results of quantitative accuracy assessment via visually-interpreted and ZY-3 samples in rural regions between GISA-10m and the existing ISA datasets. UA denotes the user's accuracy while PA means producer's accuracy.

Rural Regions	Visually interpreted samples (n=9547)				ZY-3 samples (n=43950)			
	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)
GISA-10m	81.11	75.04	88.29	92.79	67.60	42.86	92.73	97.26
GHSL2018	87.66	63.04	84.11	96.5	53.12	52.52	93.67	93.81
GLCFCS	84.86	59.79	82.79	95.56	57.13	41.87	92.51	95.81
WSF2015	85.83	60.78	83.23	95.91	55.74	47.09	93.08	95.01
FROM_GLC10	84.34	43.14	77.77	96.78	52.04	39.77	92.21	95.11
GISA	88.11	37.42	76.28	98.03	62.12	34.86	91.79	97.16
GAUD	91.17	30.87	74.61	98.88	66.68	24.99	90.76	98.33
GAIA	88.43	28.45	73.94	98.57	54.88	33.82	91.60	96.29

Table S3. Results of quantitative accuracy assessment via visually-interpreted and ZY-3 samples in rural regions between GISA-10m and the existing ISA datasets. UA denotes the user's accuracy while PA means producer's accuracy.

Arid Regions	Visually interpreted samples (n=1020)				ZY-3 samples (n=10827)			
	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)	UA of ISA (%)	PA of ISA (%)	UA of NISA (%)	PA of NISA (%)
GISA-10m	90.93	81.67	83.42	93.60	78.77	81.17	93.50	92.53
GHSL2018	93.33	79.84	81.83	95.16	75.74	61.18	87.56	93.31
GLCFCS	92.33	71.08	76.17	94.77	68.59	76.78	91.73	87.99
WSF2015	90.66	73.12	77.24	93.41	78.69	74.49	91.45	93.11
FROM_GLC10	90.79	58.25	69.79	95.35	69.30	67.09	88.88	89.85
GISA	93.31	65.38	73.52	96.32	75.11	77.39	92.20	91.24
GAUD	94.37	58.04	69.78	97.09	81.31	71.99	90.80	94.35
GAIA	92.48	60.08	70.61	95.93	70.94	74.75	91.22	89.54

Table S4. Percentage of detected buildings in arid regions between GISA-10m and the existing ISA datasets.

GISA-10m	GHSL2018	GLCFCS	WSF2015	FROM_GLC10	GISA 30m	GAUD	GAIA
92.68%	88.28%	86.85%	90.92%	77.44%	84.66%	74.11%	77.34%