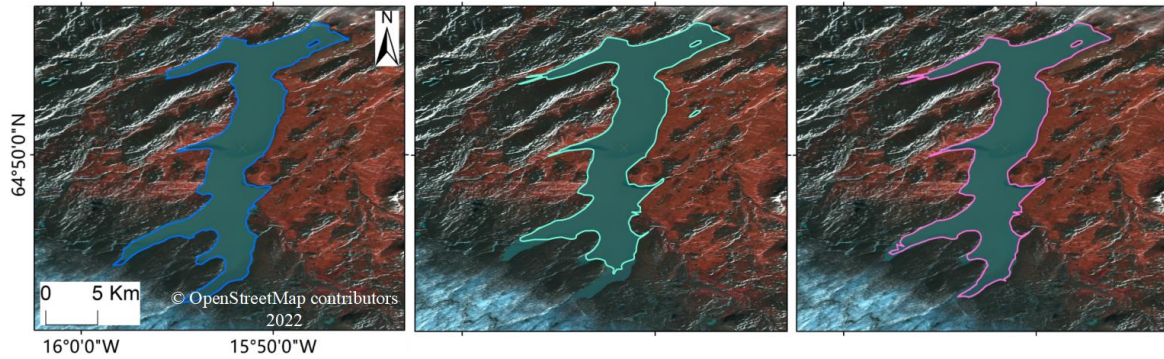
Supplementary materials

(a) OpenStreetMap   (b) HydroLAKES   (c) GRanD

Figure S1. An example of inconsistent spatial range of a lake in OSM and HydroLAKES and GRanD. © OpenStreetMap contributors 2022. Distributed under the Open Data Commons Open Database License (ODbL) v1.0.

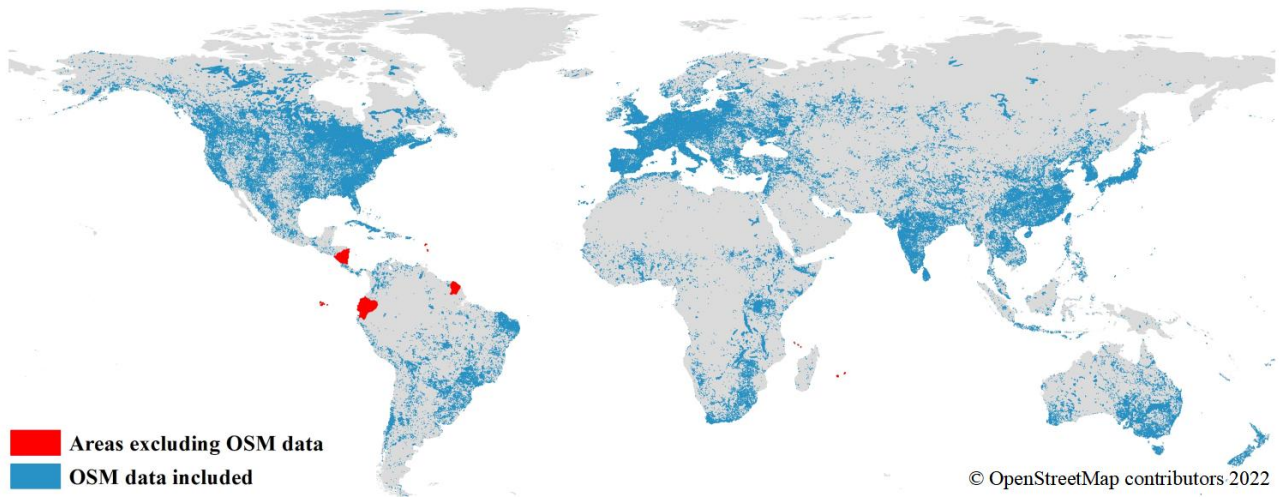



Figure S2. OSM data range not included in GLRSED. © OpenStreetMap contributors 2022. Distributed under the Open Data Commons Open Database License (ODbL) v1.0.

Table S1. Summary of the datasets used in the products of GLRSED.

Dataset	Source	Contribution
Mountain (Korner et al., 2017)	https://ilias.unibe.ch/goto_ilias3_unibe_file_10 47348.html	Identify mountain lakes
HydroBASINS (Lehner & Grill, 2013)	https://www.hydrosheds.org/products/hydrobasi ns	Identify the endorheic lakes
GlObal GeOreferenced Database of Dams (GOODD) (Mulligan et al., 2020)	http://tiny.cc/GOOD2ScientificData	Identify reservoirs
Georeferenced global Dams And Reservoirs (GeoDAR) (Wang et al., 2022)	https://doi.org/10.5281/zenodo.6163413	Identify reservoirs
SWOT River Database (SWORD) (Altenau et al., 2021)	https://zenodo.org/record/3898569	Identify lakes on the river
Randolph Glacier Inventory 6.0 (RGI 6.0) glacier data (Rignot et al., 2014)	https://www.glims.org/RGI/rgi60_dl.html	Identify glacier-fed lakes
Permafrost distribution data	https://neo.gsfc.nasa.gov/view.php?datasetId=P ermafrostNSIDC	Identify permafrost-fed lakes

 Table S2. The area distribution characteristics of lakes/reservoirs in GLRSED.

	Total	Area/km²						
		Area interval/km²						
		≤1	(1,10]	(10,100]	(100,200]	(200.500]	(500,1000]	> 1000
Continent								
North America (NA)	1338426.69	238318.9493	246445.154	201819.9311	56137.99471	77461.6361	46828.10755	471414.9173
Europe (EU)	236074.341	29880.49156	42873.6163	42705.93255	11050.32652	18373.02856	13247.87585	77943.06968
Asia (AS)	982963.7389	69294.78659	109627.7878	105224.5923	31043.28999	52152.34067	38198.0312	577422.9103
South America (SA)	155679.0442	15324.71931	22328.23708	26460.55369	10463.48472	15038.06657	15671.13724	50392.84561
Africa (AF)	277538.8052	4706.273394	7239.576697	13269.81673	8528.396997	13224.24828	11696.73701	218873.7561
Oceania (OC)	90132.09421	3754.826046	7457.528163	15024.83254	8549.869581	10336.48051	8849.141161	36159.41621
Countries with most lakes								
Canada	903010.2151	206359.4479	206597.0828	156955.3717	40260.63558	59557.27748	36364.53801	196915.8617
Russia	716297.7962	54709.79967	80528.13995	48603.40599	10111.31297	14780.1454	13478.77093	494086.2213
USA	396215.0051	29196.56325	31692.52452	34423.52151	13043.63982	15031.32062	8236.345552	264591.0898
China	119722.0969	7877.448611	16076.9255	30927.00357	11772.59413	18459.48616	14181.14868	20427.49022
Tanzania	111192.2217	86.52753129	293.7699397	496.7022434	226.2325194	973.3126468	2259.088261	106856.5885
Australia	86036.7725	3534.774801	7054.440959	13827.24997	7528.494659	9697.572901	8234.823009	36159.41621