Variable List for the GRIP-GL Routing Products

This document summarizes the key variable information for the GRIP-GL routing products. More information about the routing products can be referred to document [Routing_product_updates_history].

If you have any questions about this document, don't hesitate to contact us:

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(1) Catchment polygon attributes description

Table 1 Description of attributes in the catchment polygon shapefiles.

NO	Column name	Description	Unit
1	FID	Order of polygons starting from 0	\
2	Shape	Type of the shapefile	\
3	gridcode	Polygon (subwatershed) identifier In Version #1, gridcode is set as default 1	\
4	area/Area2	Both are area of polygon and are only different in significant digits	m^2
5	SubId	Unique polygon (subwatershed) identifier	\
6	DowSubId	SubID of the next polygon that water flows to	\
7	Rivlen	River (polyline) length contained in the subwatershed	km
8	RivSlope	Mean slope of a river segment. Defined as the ratio of elevation drop (from the farthest point to the outlet of the river) to the river length	km/km
9	BasinSlope	Mean slope of a subwatershed. Defined as the elevation drop of two points to their horizontal distance.	km/km
10	BkfWidth	Mean bank full width of the river.	m
11	BkfDepth	Mean bank full depth of the river.	m
12	IsLake	1: polygon contains one lake -9999: polygon contains no lakes	\
13	HyLakeId	HYBASIN ID from the HydroLAKES product	\
14	LakeVol	Total lake volume	0.001 km^3
15	LakeDepth	Average lake depth	m
16	LakeArea	Lake surface area (i.e. polygon area)	km^2
17	LakeType	1: Lake, small reservoirs and regulated lakes 2: Reservoir 3: Lake control (natural lake with regulation structure)	\
18	IsObs	0-211: order number of 212 flow gauges -9999: no flow gauge in polygon	\
19	MeanElev	Mean elevation of polygon	m
20	FloodP_n	Manning's coefficient of river flood plain	$s/[m^{1/3}]$
21	Q_Mean	Mean reference discharge of a subwatershed. Estimated from observations.	m^3/s

NO	Column name	Description	Unit
22	Ch_n	Manning's coefficient of river channels. Estimated from the Manning's formula.	$s/[m^{1/3}]$
23	LakeRatio	0-1: Ratio of lake area to subwatershed area -9999: no lakes in subwatershed	\
24	INSIDE_X	Longitude of subwatershed centroid	degrees
25	INSIDE_Y	Latitude of subwatershed centroid	degrees
26	Lat_outlet	Latitude of subwatershed outlet	degrees
27	Lon_outlet	Longitude of subwatershed outlet	degrees
28	Perim_m	Perimeter of subwatershed polygon	m
29	Gauge_ID	Gauge ID	\
30	Country	Gauge country, CA or US	\
31	Area_doc	Documented catchment area	km^2
32	Lake_info	Lake name that the river eventually flows into	\
33	Watershed	Catchment number, from GL001 to GL156, based on catchment area ascending	\
34	Cal_Val	C: gauge for calibration V: gauge for validation	\
35	Mostdowns	True: is most-downstream gauge False: is not most-downstream gauge	\
36	unadjust_A	Unadjusted subwatershed area, equal to area and Area2	m^2
37	Adjust_A	Adjusted subwatershed area. Defined as unadjust_A * (unadjust_A / Area_doc) * 10^{-12}	m^2
38	Error_A	Defined as (unadjust_A – adjust_A) / adjust_A	%
39	Ratio_A	Areal ratio of subwatershed area to entire catchment area. Defined as adjust_A / Area_doc / 10^{-6}	\

(2) Catchment-forcing-grid overlay polygon attributes description

Most attributes in catchment-forcing-grid overlay shapefiles are consistent with (1). Additional attributes are listed in Table 2.

Table 2 Description of additional attributes in the catchment-forcing-grid overlay polygon shapefiles.

NO	Column name	Description	Unit
40	FGID	Index of forcing grid cell in the netCDF file	\
41	Row	Row number (latitude dimension) of forcing grid cell in the netCDF file	\
42	Col	Column number (longitude dimension) of forcing grid cell in the netCDF file	\
43	Gridlon	Longitude of forcing grid central point in the netCDF file	degrees
44	Gridlat	Latitude of forcing grid central point in the netCDF file	degrees
45	Uadj_PA	Unadjusted area of the catchment-forcing-grid crossing region	m^2
46	Adj_PA	Adjusted area of the catchment-forcing-grid crossing region. Defined as unadjust_PA * (unadjust_A / Area_doc) * 10^{-12}	m^2
47	Ratio_PA	Areal ratio of the catchment-forcing-grid crossing region to the subwatershed area that the crossing region belongs to. Defined as Adj_PA / adjust_A	\

(3) River network polyline attributes description

All the attributes of river polylines are consistent with those in (1); thus, Table 1 can be referred to.

(4) Lake polygon attributes description

Lakes included in the product are from the HydroLAKES data base. To reveal more details of lakes, we extracted the full lake attributes into the lake polygon shapefile. Users can either refer to the HydroLAKES metadata file or use Table 3.

Table 3 Description of attributes in the lake polygon shapefiles.

NO	Column name	Description	Unit
1	FID	Order of polygons starting from 0	\
2	Shape	Type of the shapefile	\
3	Hylak_id	Unique lake identifier	\
4	Lake_name	Name of lake or reservoir	\
5	Country	Country that the lake (or reservoir) is located in	\
6	Continent	Continent that the lake (or reservoir) is located in	\
7	Poly_src	Source of original lake polygon: CanVec; SWBD; MODIS; NHD; ECRINS; GLWD; GRanD; or Other More information on these data sources can be found in HydroLAKES metadata.	\
8	Lake_type	1: Lake, small reservoirs and regulated lakes 2: Reservoir 3: Lake control (natural lake with regulation structure)	\
9	Grand_id	ID of the corresponding reservoir in the GRanD database, or value 0 for no corresponding GRanD record.	\
10	Lake_area	Lake surface area (i.e. polygon area)	km^2
11	Shore_len	Length of shoreline (i.e. polygon outline)	km
12	Shore_dev	Shoreline development, measured as the ratio between shoreline length and the circumference of a circle with the same area	\
13	Vol_total	Total lake or reservoir volume	0.001 km^3
14	Vol_res	Reported reservoir volume, or storage volume of added lake regulation, in million cubic meters	0.001 km^3
15	Vol_src	1: ‘Vol_total’ is the reported total lake volume from literature	\

NO	Column name	Description	Unit
		2: 'Vol_total' is the reported total reservoir volume from GRanD or literature 3: 'Vol_total' is the estimated total lake volume using the geostatistical modeling approach by Messager et al. (2016)	
16	Depth_avg	Average lake depth	m
17	Dis_avg	Average long-term discharge flowing through the lake	m^3
18	Res_time	Average residence time of the lake water. -1: cannot be calculated as 'Dis_avg' is 0 -9999: no data as lake pour point is not on HydroSHEDS landmask	days
19	Elevation	Elevation of lake surface	m
20	Slope_100	Average slope within a 100 meter buffer around the lake polygon	degrees
21	Wshd_area	Area of the watershed associated with the lake	km^2
22	Pour_long	Longitude of the lake pour point	degrees
23	Pour_lat	Latitude of the lake pour point	degrees
24	Cat_subid	SubId of the watershed polygon that the lake is located in	\
25	Cat_dsubid	DowSubId of the watershed polygon that the lake is located in	\

Reference

Andreadis, K. A., G. J.-P. Schumann, and T. Pavelsky (2013), A simple global river bankfull width and depth database, Water Resour. Res., 49, 7164–7168, doi:10.1002/wrcr.20440.

Lehner, B., Verdin, K., Jarvis, A. (2008): New global hydrography derived from spaceborne elevation data. Eos, Transactions, AGU, 89(10): 93-94.

Messager, M.L., Lehner, B., Grill, G., Nedeva, I., Schmitt, O. (2016): Estimating the volume and age of water stored in global lakes using a geo-statistical approach. Nature Communications: 13603. doi: 10.1038/ncomms13603. Data is available at www.hydrosheds.org.