

Elevation cluster dataset covering the eco-region of the Roof of the World

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Abstract: This dataset, titled as elevation cluster dataset covering the eco-region of the Roof of the World (ROTWEVC for short), is 30-m raster data on land elevation classification in the eco-region of the Roof of the World. 17 classes of land elevation levels are identified from less than 500 meters above sea level to more than 8000 meters. The dataset is developed based on ASTER GDEM 2 and integrated partly with SRTM where the former data is not available. By statistics, the land located between 4500-5000 meters above sea level is 910,860 km², which occupies 22.77% of the region; while the land above 4000 meters is 2,150,236 km², 53.75% of the region is located in this high area. The area with elevation less than 4000 meters is mainly distributed around area of plateau, where is the transition zone from low altitude plain to high altitude plateau. 475 datasets with 1 × 1 degree latitude and longitude, the total volume of the data is 249 MB, compressed 194 MB.

Keywords: Roof of the World, eco-region, DEM, elevation, data, Qinghai-Tibet Plateau, Hindu Kush Himalaya

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1 Introduction

The Roof of the World is characterized by its high mountains and plateaus^[1], therefore, elevation clusters of the eco-region of the Roof of the World (ROTWEVC) is one of the fundamental datasets to conduct ecological studies in this region^[2-4]. This paper is consisted two parts, first part illustrates the dataset ROTWEVC with metadata; second part demonstrates its innovation and reliability.

2 Metadata of the ROTWEVC

The descriptions of the ROTWEVC dataset are recorded. These information include the

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Table 1 Summary of the ROTWEVC metadata

Dataset full name	Elevation cluster dataset covering the eco-region of the Roof of the World		
Dataset short name	ROTWEVC		
Corresponding author	LIU Chuang (lchuang@igsnrr.ac.cn)		
Authors	LIU Chuang, IGSNRR/CAS, lchuang@igsnrr.ac.cn		
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	CHEN Wenbo, Keio Research Institute at SFC, Keio University, chenwb@sfc.keio.ac.jp, chenwb3@gmail.com		
Geographical regions	ZHOU Xiang, RADI/CAS, zhouxiang@radi.ac.cn		
	WANG Zhengxing, IGSNRR/CAS, wangzx@igsnrr.ac.cn		
	The geographical region covers the area from N40°1'52" - N23°11'59", E105°43'45" - E61°28'45", including the Qinghai Tibet Plateau, Hengduan Mountains, Himalaya mountains, Hindu Kush, Pamir Plateau. The region covers the area of the following nations: China, Myanmar, Nepal, Bhutan, India, Pakistan, Afghanistan, Tajikistan, and Kyrgyzstan.		
Time	2014		
Spatial resolution	30m		
Dataset format	.tiff .zip	Dataset size	1.2GB
Dataset publisher	Global Change Research Data Publishing and Repository DOI:10.3974/		
Data access and services platform	Global Change Research Data Publishing and Repository, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, http://www.geodoi.ac.cn		
	National Data Sharing Infrastructure of Earth System Sciences of China, http://www.geodata.cn		
Academic editors	ZHU Yunqiang, CHEN Shengbo, HE Shujin		
Data sharing policy	The authors of the dataset agree to publish the data here according to the Article I of Data Sharing Policy of the Global Change Data Publishing and Repository, which states that the dataset can be used freely for research, education, and decision making; any users for commercial uses should get formal permission from IGSNRR/CAS.		

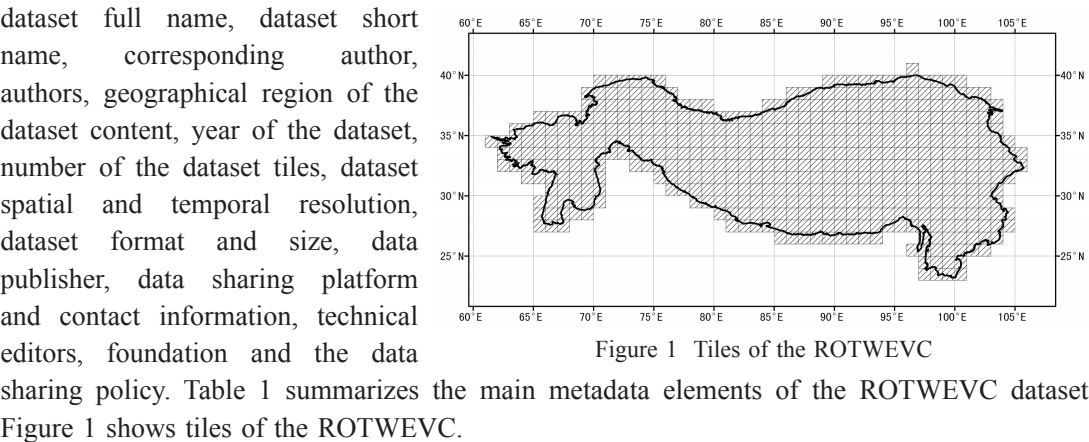


Figure 1 Tiles of the ROTWEVC

3 Methodology of dataset development

3.1 Dataset pre-processing

The ROTWEVC is developed based on ASTER GDEM 2 (Japan, ASTER GDS User Service, 2011)^[5]. The quality assessment shows that there are some outliers or no-data area in ASTER GDEM 2 (Figures 2, 3 and 6).

The data outliers or no-data area were detected and replaced with SRTM or adjacent data

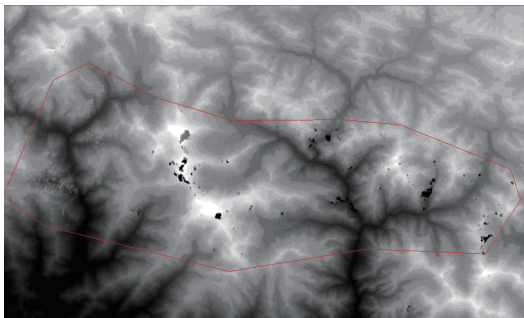


Figure 2 Data outliers or no-data area (dark patches)

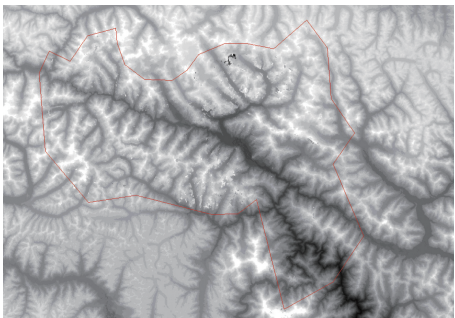


Figure 3 Data outliers or no-data area (dark patches)

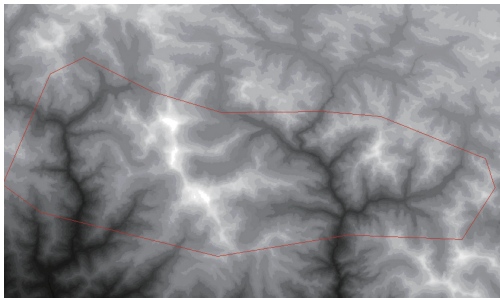


Figure 4 Data outliers or no-data area were replaced with SRTM

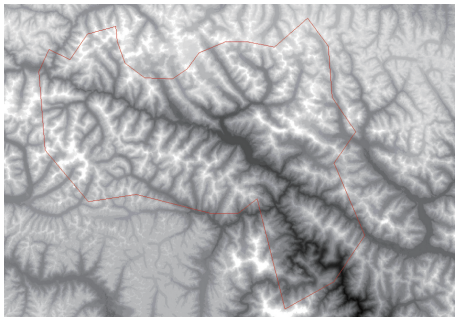


Figure 5 Data outliers or no-data area were replaced with SRTM



Figure 6 Data outliers or no-data area (white lines)



Figure 7 Data outliers or no-data area were replaced with adjacent data

^[6], the re- constructed data were like Figures 4, 5 and 7.

3.2 Elevation cluster system

To balance the needs from local, regional and global studies, the elevation cluster system consists of a cluster by 500 m-step with a total of 17 clusters (Table 2). It is worth noting that the elevation data in each pixel in this dataset is an average within a 30 m x 30 m grid, not the point which marks for peak of the pixel of mountain.

Table 2 Elevation cluster system in the eco-regions of Roof of the World

Cluster	Elevation (m)	Cluster	Elevation (m)	Cluster	Elevation (m)
1	< 500	7	3000-2500	13	6000-6500
2	500-1000	8	3500-4000	14	6500-7000
3	1000-1500	9	4000-4500	15	7000-7500
4	1500-2000	10	4500-5000	16	7500-8000
5	2000-2500	11	5000-5500	17	>= 8000
6	2500-3000	12	5500-6000		

3.3 Dataset files

ROTWEVC geographically ranges from N23°41'49"-40°1'52" to E61°28'45"-105°43'45"^[7], totaling 4, 003,562 km². Considering their huge volume in 30- m scale, the dataset is divided into one-by-one degree tiles according to the latitude and longitude system.

The ROTWEVC dataset is composed of 476 tiles in ".zip" format, each tile is in one-by-one latitude and longitude degree grid. The ".zip" was named like "EVC_NxxExxx.zip", in which the Nxx represents its latitude in South-West corner, while the Exx represents its longitude in South-West corner. For instance, the file named "EVC_N30E080.Zip" starts at N30E080, goes forward to north and to east for one degree, respectively. In other words, this file covers the region between N30-N31 and E80-E81 (Figure 8).

In order to make the dataset easy to be accessed, 475 datasets were compressed into 26 files of the dataset groups, and the files were named according to the standard of the 1:1,000,000 scale of international topographic maps (The data size of each file is no more than 10 MB generally).

4 Statistics of elevation clusters in the eco-region of Roof of the World

The eco-region of Roof of the World consists of 17 clusters in elevation (See Figure 9); their areas are listed in Table 3. The land above 4000 m is about 215.02 km², accounting for 53.75% of all region (Figures 10 and 11). It is clear that the region of 4500-5000 m is the dominate cluster in the Roof of the World (Table 3). Figure 11 shows that the area which elevation is equal and below 4000 m is mainly located in the brink of the region^[8].

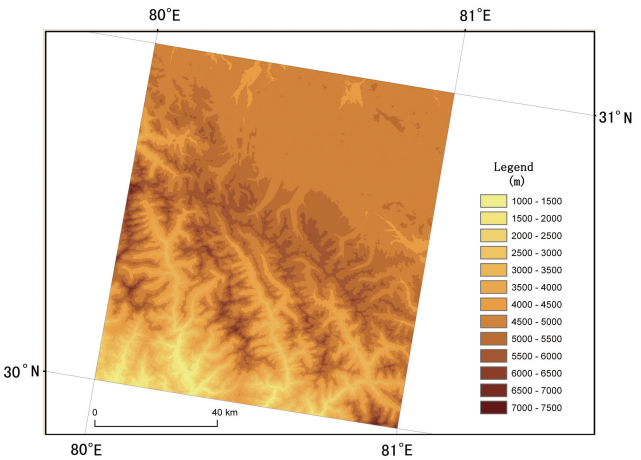


Figure 8 The tile of N30E080 from the ROTWEVC

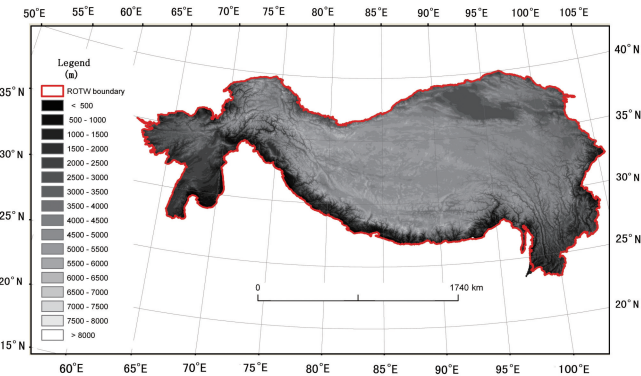


Figure 9 Overview of the ROTWEVC

Table 3 Area and percentage of each elevation clusters in eco-region of the Roof of the World

Cluster	Elevation (m)	Area (km ²)	%
1	< 500	37383.4404	0.9344
2	500-1000	117723.4317	2.9426
3	1000-1500	176710.5423	4.4170
4	1500-2000	249951.1473	6.2477
5	2000-2500	262797.5628	6.5688
6	2500-3000	337231.0008	8.4293
7	3000-2500	317303.379	7.9312
8	3500-4000	351350.6823	8.7823
9	4000-4500	535496.9355	13.3851
10	4500-5000	910860.7023	22.7676
11	5000-5500	572040.7785	14.2986
12	5500-6000	115895.3688	2.8969
13	6000-6500	14132.4219	0.3532
14	6500-7000	1418.7861	0.0355
15	7000-7500	319.2075	0.0080
16	7500-8000	64.5669	0.0016
17	>= 8000	7.6203	0.0002

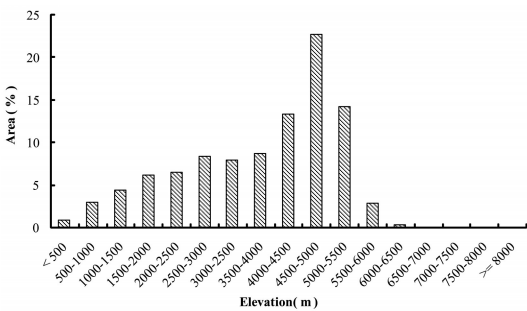


Figure 10 Percentages of each elevation clusters in the eco-region of the roof of the world

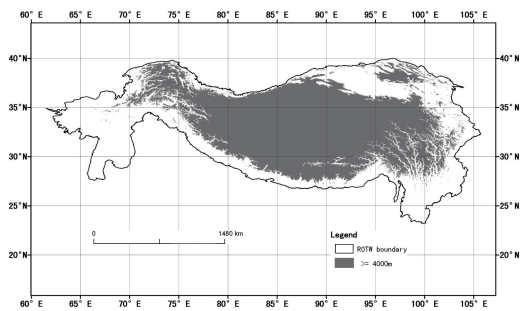


Figure 11 Overview of elevation cluster is equal and higher than 4,000 meters above sea level

5 Conclusions

The raster data on elevation clusters in 30 meters resolution of eco-region of the Roof of the World (ROTWEVC) has been detected. By re- building the "data holes" in original ASTER GDEM 2, the 17 clusters of elevation are identified and calculated. In which, the areas which elevation is equal and higher than 4000 meters above see level, is 2,150,377 km², which covers more than half of the area of the region (53.75%). The ROTWEVC datasets can be used in ecosystem analysis as well as research for geography, ecosystem, environment, disaster, etc.

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