A Big Earth Data Platform for Three Poles

**Map of the frozen soil in the Tibetan Plateau (2003)**

1、Description

The Tibetan Plateau is known as “The World’s Third Pole” and “The Water Tower of Asia”. A relatively accurate map of the frozen soil in the Tibetan Plateau is therefore significant for local cold region engineering and environmental construction. Thus, to meet the engineering and environmental needs, a decision tree was established based on multi-source remote sensing data (elevation, MODIS surface temperature, vegetation index and soil moisture) to divide the permafrost and seasonally frozen soil of the Tibetan Plateau. The data are in grid format, DN=1 stands for permafrost, and DN=2 stands for seasonally frozen soil.  
The elevation data are from the 1 km x 1 km China DEM (digital elevation model) data set (http://westdc.westgis.ac.cn); the surface temperature is the yearly average data based on daily data estimated by Bin Ouyang and others using the Sin-Linear method. The estimation of the daily average surface temperature was based on the application of the Sin-Linear method to MODIS surface products, and to reduce the time difference with existing frozen soil maps, the surface temperature of the study area in 2003 was used as the information source for the classification of frozen soil. Vegetation information was extracted from the 16-day synthetic product data of Aqua and Terra (MYD13A1 and MOD13A1) in 2003. Soil moisture values were obtained from relatively high-quality ascending pass data collected by AMSR-E in May 2003. Therefore, based on the above data, the classification threshold of the decision tree was obtained using the Map of Frozen Soil in the Tibetan Plateau (1:3000000) and Map of the Glaciers, Frozen Soil and Deserts in China (1:4000000) as the a priori information. Based on the prosed method, the frozen soil types on the Tibetan Plateau were classified.  
The classification results were then verified and compared with the surveyed maps of frozen soil in the West Kunlun Mountains, revised maps, maps of hot springs and other existing frozen soil maps related to the Tibetan Plateau. Based on the Tibetan Plateau frozen soil map generated from the multi-source remote sensing information, the permafrost area accounts for 42.5% (111.3 × 104 km²), and the seasonally frozen soil area accounts for 53.8% (140.9 × 104 km²) of the total area of the Tibetan Plateau. This result is relatively consistent with the prior map (the 1:3000000 Map of Frozen Soil in the Tibetan Plateau). In addition, the overall accuracy and Kappa coefficient of the different frozen soil maps show that the frozen soil maps compiled or simulated by different methods are basically consistent in terms of the spatial distribution pattern, and the inconsistencies are mainly in the boundary areas between permafrost areas and seasonally frozen soil areas.

2、Keywords

Theme：Frozen ground distribution,Ground temperature,Frozen Ground  
Discipline：Cryosphere  
Places：Tibetan Plateau   
Time：2003

3、Data details

1.Scale：None

2.Projection：Albers

3.Filesize：30.0MB

4.Data format：TIFF

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：39.47 | - |
| west：73.19 | - | east：104.47 |
| - | south：26.0 | - |

5、Time frame:2003-01-16 19:09:00+00:00--2004-01-15 19:09:00+00:00

6、Reference method

References to data:

NIU Fujun. Map of the frozen soil in the Tibetan Plateau (2003). A Big Earth Data Platform for Three Poles, doi:10.11888/GlaciolGeocryo.tpe.00000048.file2018

References to articles:

Niu, F.J., Zheng, H., & Li, A. (2018). The study of frost heave mechanism of high-speed railway foundation by field-monitored data and indoor verification experiment. Acta Geotechnica.

7、Supporting project information

CASEarth:Big Earth Data for Three Poles（grant No. XDA19070000）

8、Data resource provider

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