A Big Earth Data Platform for Three Poles

**Glacier Climate Sensitivity Zoning Map (2000-2017)**

1、Description

The alpine region of Asia is the third pole in the world, and it is called the "Asian water tower". Affected by climate warming, glaciers continue to lose money, which has profoundly changed the supply-demand relationship of glacial water resources. In order to systematically understand the response of glaciers to climate change, the project reveals the relationship between the change of glacier material balance and climate factors through the sensitivity of glacier material balance. The data includes two maps: the sensitivity distribution map of material balance to temperature and precipitation and the climate sensitivity zoning.
In the past 70 years, there have been significant differences in the evolution sequence of glacier material balance among mountain systems in the high mountain region of Asia. The glaciers in the Karakoram and West Kunlun regions have shown a stable state, and the material balance is a weak positive balance, while the Himalayas, Tianshan and Qilian Mountains have shown an accelerated trend after 1990. This is mainly due to the sensitivity of material balance to temperature and precipitation. The monthly scale material balance model is driven by 0.5 ° resolution era5 temperature and precipitation data, and the material balance calibration parameters of 43 monitored glaciers are 1 ° from 2000 to 2016 × The parameters are spatially constrained by the 1 ° aster material balance data, and the material balance sequences of 95085 glaciers in the high mountain region of Asia from 1951 to 2020 are reconstructed by using the method of extrapolation of spatial parameters. The sensitivity of glacier material balance to temperature (± 0.5K, ± 1K, ± 1.5k) and precipitation (± 10%, ± 20%, ± 30%) is analyzed, In combination with the influencing factors of glacier material balance (distribution of summer temperature, ratio of summer precipitation, distribution of glacier types, distribution of clear sky solar radiation in summer, etc.), the glacial climate sensitivity in the high mountain region of Asia is classified and divided into four categories, as shown in Fig. 4: the main control area of air temperature: the temperature is the main control factor of glacier material balance change, and precipitation occupies a secondary position; Precipitation control area: the glacier is mainly controlled by precipitation, and the temperature in the glacier area is lower than 0 ° C throughout the year; Temperature and precipitation control area of accumulated glacier in winter: refers to that the glacier is mainly supplied by precipitation in winter, and the change of material balance of the glacier is the result of the joint action of temperature and precipitation; Summer cumulative glacier temperature and precipitation control area: refers to the supply mode of glacier is summer precipitation, and the material balance of glacier is the result of the joint action of temperature and precipitation.

2、Keywords

Theme：Surface mass balance,ice discharge,Glacier(Ice Sheet),Glacier climate
Discipline：Cryosphere
Places：High Mountian Asia
Time：2000-2016

3、Data details

1.Scale：None

2.Projection：

3.Filesize：3.7MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：45.0 | - |
| west：68.0 | - | east：103.0 |
| - | south：23.0 | - |

5、Time frame:1999-12-31 16:00:00+00:00--2016-12-30 16:00:00+00:00

6、Reference method

References to data:

SHANGGUAN Donghui. Glacier Climate Sensitivity Zoning Map (2000-2017). A Big Earth Data Platform for Three Poles, doi:10.11888/Cryos.tpdc.2727992022

References to articles:

Wang, R.J., Ding, Y.J., Shangguan, D.H., Guo, W.Q., Zhao, Q.D., Li, Y.J., & Song, M. (2022). Influence of Topographic Shading on the Mass Balance of the High Mountain Asia Glaciers. Remote Sensing 14, no. 7: 1576. https://doi.org/10.3390/rs14071576

7、Supporting project information

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

8、Data resource provider

name: SHANGGUAN Donghui
unit:
email: dhguan@lzb.ac.cn