A Big Earth Data Platform for Three Poles

**Observation data of temperature and rainfall in permafrost regions of Qinghai-Tibet Engineering Corridor (1956-2012)**

1、Description

The data set includes the trends of annual average temperature and rainfall changes at the three meteorological stations in the permafrost section of the Qinghai-Tibet Engineering Corridor over the past 50 years. According to the recorded data, the annual average temperature is experiencing a gradually rising process. The annual average temperature change over the past 56 years in Wudaoliang and Tuotuohe has a good correlation (r2=0.83). In 1957, the average annual temperatures of Wudaoliang and Tuotuohe were -6.6 °C and -5.1 °C, respectively. By 2012, the temperatures of the two stations were -4.6 and -3.1 °C, and the total temperature has risen by approximately 2 °C. The annual average temperature rises by 0.03-0.04 °C. The annual average temperature changes over the past 47 years in Wudaoliang and Anduo also have a good correlation (r2=0.84). In 1966, the average annual temperature in Anduo was -3.0 °C. By 2012, the temperature has risen to -1.8 °C, corresponding to a total temperature rise of approximately 1.2 °C and an annual average temperature rise of 0.02-0.03 °C. The annual average temperature in Wudaoliang and Tuotuohe rose slightly faster than that in Anduo.
However, the change in rainfall was more volatile than that of temperature. The correlation between the rainfall change in Wudaoliang and Tuotuohe over the past 56 years is relatively poor (r2=0.60). In 1957, the annual rainfall amounts in Wudaoliang and Tuotuohe were 302 and 309 mm, respectively. By 2012, the annual rainfall amounts at the two stations were 426 and 332 mm. Thus, the rainfall in Wudaoliang had increased by 124 mm, with an annual rainfall increase of approximately 2 mm. In contrast, the annual rainfall in Tuotuohe only increased by 0.4 mm. The correlation between the rainfall change in Wudaoliang and Anduo over the past 47 years is also poor (r2=0.35). In 1966, and 2012, the annual average rainfall amounts in Anduo were 354 and 404 mm. The total increase was approximately 50 mm, and the annual average increase was 1 mm. The annual rainfall in Wudaoliang increased the fastest.
The observation data from the three meteorological stations reveal climate changes in the permafrost sections of the Qinghai-Tibet Engineering Corridor. Judging from the overall trend of temperature and rainfall changes, the temperature in the northern and central parts of the corridor has increased rapidly over the past 50 years, exceeding the global average of 0.02 °C/a (IPCC). The rainfall increase in the northern part of the corridor is also obvious, especially the rate of rainfall increase at the Wudaoliang meteorological station. Increases in both temperature and rainfall have a great impact on accelerating the spatial variation in permafrost, and they are the leading cause of permafrost degradation on the Tibetan Plateau.

2、Keywords

Theme：Precipitation,Temperature,Precipitation amount,Frozen Ground,Air temperature
Discipline：Atmosphere,Cryosphere
Places：the Qinghai-Tibet Engineering Corridor
Time：1956-2012

3、Data details

1.Scale：None

2.Projection：

3.Filesize：0.083MB

4.Data format：EXCEL

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：38.68 | - |
| west：92.83 | - | east：93.2 |
| - | south：35.43 | - |

5、Time frame:1956-10-10 00:00:00+00:00--2013-01-09 00:00:00+00:00

6、Reference method

References to data:

LIN Zhanju, NIU Fujun. Observation data of temperature and rainfall in permafrost regions of Qinghai-Tibet Engineering Corridor (1956-2012). A Big Earth Data Platform for Three Poles, doi:10.11888/AtmosEnviron.tpe.0000079.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

name: NIU Fujun
unit: Northeast Institute of Ecology and Environmental Resources,Chinese Academy of Sciences
email: niufujun@lzb.ac.cn

name: LIN Zhanju
unit:
email: zhanjulin@lzb.ac.cn