A Big Earth Data Platform for Three Poles

**Simulated data of permafrost range, frozen soil active layer thickness and carbon flux in the Qinghai Tibet Plateau and circumarctic region**

1、Description

Based on the CMIP6 model data (see Table 1 for the model list), the distribution and thickness of frozen soil in the Qinghai Tibet Plateau and the circum Arctic region, as well as the terrestrial ecosystem carbon flux (total primary productivity GPP and ecosystem carbon source sink NEP) data in the frozen soil area under different climate change scenarios (including SSP126, SSP245 and SSP585) in the historical period (1990-2014) and the future (2046-2065) are estimated, with a spatial resolution of 1 ° × 1°。 Among them, the distribution of frozen soil is estimated under the future climate warming scenario by using the spatial constraint method (Chadburn et al., 2017), based on the probability of frozen soil occurrence under different temperature gradients at the current stage, and combined with the future temperature change simulated by the Earth system model. For the change of active layer thickness, the sensitivity of active layer thickness to temperature change estimated by remote sensing at this stage is used to constrain the change of active layer thickness simulated by the Earth System Model, so as to correct the error of the model in simulating the thickness of frozen soil active layer. The future permafrost carbon flux is the multi model ensemble average of the Earth system model simulation results.
The simulation results show that the permafrost in the Qinghai Tibet Plateau will be significantly degraded under the future climate change scenario. With the future temperature rise, the continuous permafrost regions will be shown as carbon sources, but the temperature rise will promote the growth of vegetation, and the carbon sink capacity in the discontinuous permafrost regions will be enhanced. Similar to the Qinghai Tibet Plateau, the permafrost around the Arctic will also be generally degraded in the future, and the future climate warming will promote the growth of vegetation in the Arctic, thus enhancing regional carbon sinks.

2、Keywords

Theme：Carbon Flux,active layer,Permafrost,Frozen Ground
Discipline：Cryosphere
Places：Qinghai-Tibetan Plateau
Time：Historical period (1990-2014) and future (2046-2065)

3、Data details

1.Scale：None

2.Projection：None

3.Filesize：9.95MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：90.0 | - |
| west：-180.0 | - | east：180.0 |
| - | south：-90.0 | - |

5、Time frame:None--None

6、Reference method

References to data:

WANG Tao, LIU Dan , WEI Jianjun . Simulated data of permafrost range, frozen soil active layer thickness and carbon flux in the Qinghai Tibet Plateau and circumarctic region. A Big Earth Data Platform for Three Poles, doi:10.11888/Cryos.tpdc.2728722022

References to articles:

7、Supporting project information

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

8、Data resource provider

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