A Big Earth Data Platform for Three Poles

**Long-term series of daily snow depth dataset over the Northern Hemisphere based on machine learning （1980-2019）**

1、Description

Supported by the Strategic Priority Research Program of the Chinese Academy of Science (XDA19070100). Tao Che, the director of this program, who comes from Key Laboratory of Remote Sensing of Gansu Province, Northwest Institute of Eco-Environment and Resources, CAS. They used machine learning methods combined with multi-source gridded snow depth product data to derive a long-time series over the Northern Hemisphere.  
Firstly, the applicability of artificial neural network (ANN), support vector machine (SVM) and random forest (RF) method in snow depth fusion are compared. It is found that random forest method shows strong advantages in snow depth data fusion. Secondly, using the random forest method, combined with remote sensing snow depth products such as AMSR-E, AMSR-2, NHSD and GlobSnow and reanalysis data such as ERA-Interim and MERRA-2. These gridded snow depth products and environmental factor variables are used as the input independent variables of the model. In situ observations of China Meteorological Station (945), Russia Meteorological Station (620), Russian snow survey data (514), and global historical meteorological network (41261) are used as reference truth to train and verify the model. The daily gridded snow depth dataset of the snow hydrological year from 1980 to 2019 (September 1 of the previous year to May 31 of the current year) is prepared on the cloud platform provided by the CASEarth. Since the passive microwave brightness temperature data from 1980 to 1987 is the data of every other day, there will be a small number of missing trips in the data during this period. Using the ESM-SnowMIP and independent ground observation data for verification, the quality of the fusion data set has been improved. According to the comparison between the ground observation data and the snow depth products before fusion, the determination coefficient (R2) of the fusion data is increased from 0.23 (GlobSnow snow depth product) to 0.81, and the corresponding root mean square error (RMSE) and mean absolute error (MAE) are also reduced to 7.7 cm and 2.7 cm.

2、Keywords

Theme：Snow depth,Snow  
Discipline：Cryosphere  
Places：Northern Hemispheric  
Time：1980-2019

3、Data details

1.Scale：None

2.Projection：

3.Filesize：2834.81MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：0.0 | - |
| west：-180.0 | - | east：180.0 |
| - | south：90.0 | - |

5、Time frame:1980-08-31 16:00:00+00:00--2019-05-30 16:00:00+00:00

6、Reference method

References to data:

HU Yanxing, XIAO Lin, DAI Liyun, CHE Tao. Long-term series of daily snow depth dataset over the Northern Hemisphere based on machine learning （1980-2019）. A Big Earth Data Platform for Three Poles, doi:10.11888/Snow.tpdc.2717012021

References to articles:

Hu,Y.X., Che, T., Dai, L.Y., & Xiao, L. (2021). Snow depth fusion based on machine learning methods for the Northern Hemisphere. Remote Sensing, 13,1250.

7、Supporting project information

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

8、Data resource provider

name: CHE Tao  
unit:   
email: chetao@lzb.ac.cn  
  
name: DAI Liyun  
unit:   
email: dailiyun@lzb.ac.cn  
  
name: HU Yanxing  
unit:   
email: huyanxing@lzb.ac.cn  
  
name: XIAO Lin  
unit:   
email: xiaolin@lzb.ac.cn