A Big Earth Data Platform for Three Poles

**SMAP soil moisture and vegetation optical depth product using MCCA (2015-2022)**

1、Description

Soil moisture is an important boundary condition of earth-atmosphere exchanges, and it has been defined as an essential climate variable by GCOS. Vegetation optical depth is a physical variable to measure the attenuation of vegetation in microwave radiative transfer model, and it has been proved to be a good indicator of vegetation water content and biomass.  
This dataset uses the multi-channel collaborative algorithm (MCCA) to retrieve both soil moisture and polarized vegetation optical depth with SMAP brightness temperature. The algorithm uses a self-constraint relationship between land parameters and an analytical relationship between brightness temperature at different channels to perform the retrieval process. The MCCA does not depend on other auxiliary data on vegetation properties and can be applied to a variety of satellites. The soil moisture product from this dataset includes the soil moisture content in the unfrozen period and the liquid water content in the frozen period. Both horizontal- and vertical-polarization vegetation optical depth are retrieved. So far as we know, it is the first polarization-dependent vegetation optical depth product at L-band.  
This dataset was validated by 19 dense soil moisture observation networks (9 core validation sites used by SMAP team and 13 sites not used by them), and the widely used soil climate analysis network (SCAN). It was found that ubRMSE (unbiased root mean square error) of MCCA retrieved soil moisture is generally smaller than that of other SMAP products.

2、Keywords

Theme：Soil,SMAP,Vegetation,Remote Sensing Technology,Soil moisture,microwave remote sensing,vegetation optical depth,Terrestrial Surface Remote Sensing  
Discipline：Terrestrial Surface,Remote Sensing Technology  
Places：Global  
Time：2015-2022

3、Data details

1.Scale：None

2.Projection：WGS84

3.Filesize：7375.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：85.044 | - |
| west：180.0 | - | east：180.0 |
| - | south：85.044 | - |

5、Time frame:2015-03-30 16:00:00+00:00--2022-11-18 16:00:00+00:00

6、Reference method

References to data:

SHI Jiancheng, PENG Zhiqing , YAO Panpan, ZHAO Tianjie. SMAP soil moisture and vegetation optical depth product using MCCA (2015-2022). A Big Earth Data Platform for Three Poles, doi:10.11888/Terre.tpdc.2720882022

References to articles:

Zhao, T.J., Shi, J.C., Entekhabi, D., Jackson, T.J., Hu, L., Peng, Z.Q., Yao, P.P., Li, S.N., & Kang, C.S. (2021). Retrievals of soil moisture and vegetation optical depth using a multi-channel collaborative algorithm. Remote Sensing of Environment, 257, 112321.

7、Supporting project information

Second Tibetan Plateau Scientific Expedition Program

8、Data resource provider

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