A Big Earth Data Platform for Three Poles

**A long term global daily soil moisture dataset derived from AMSR-E and AMSR2 (2002-2022)**

1、Description

Long term surface soil moisture (SSM) data with stable and consistent quality are critical for global environment and climate change monitoring. L band radiometers onboard the recently lunched Soil Moisture Active Passive (SMAP) Mission can provide the state-of-the-art accuracy SSM, but the short temporal coverage of the data records has limited its applications in long-term studies. While Advanced Microwave Scanning Radiometer for EOS (AMSR-E) and AMSR2 series provide long term observational records of multi-frequency radiometers (C, X, and K bands). This dataset contains 20 years (2002-2022) global spatio-temporal consistent surface soil moisture. The resolution is 36 km at daily scale, the projection is EASE-Grid2, and the data unit is m3 / m3. This dataset adopts the soil moisture neural network retrieval algorithm developed by Yao et al. (2017). This study transfers the merits of SMAP to AMSR-E/2 through using an Artificial Neural Network (ANN) in which SMAP standard SSM products serve as training targets with AMSR-E/2 brightness temperature (TB) as input. Finally, long term soil moisture data are output. This dataset can reproduce the spatial and temporal distribution of SMAP soil moisture, with comparable accuracy as SMAP soil moisture product. This dataset also compares well with in situ SSM observations at 14 dense validation networks globally, with accuracy of 5% volumetric water content, and outperforms AMSR-E/2 standard SSM products from JAXA and LPRM. This global observation-driven dataset spans nearly two decades at present, and is extendable though the ongoing AMSR2 and upcoming AMSR3 missions for long-term studies of climate extremes, trends, and decadal variability.

2、Keywords

Theme：soil moisture,Soil,Passive microwave remote sensing,Surface Freeze-thaw Cycle/state Remote Sensing,Hydrology,Soil moisture/Water content  
Discipline：Terrestrial Surface,Cryosphere  
Places：Globe  
Time：2002-2022

3、Data details

1.Scale：None

2.Projection：WGS84

3.Filesize：21514.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：83.64 | - |
| west：-179.82 | - | east：179.82 |
| - | south：-83.64 | - |

5、Time frame:2002-07-27 08:00:00+00:00--2022-08-31 03:59:59+00:00

6、Reference method

References to data:

YAO Panpan, LU Hui. A long term global daily soil moisture dataset derived from AMSR-E and AMSR2 (2002-2022). A Big Earth Data Platform for Three Poles, doi:10.11888/Soil.tpdc.2709602020

References to articles:

Yao, P.P., Shi, J.C., Zhao, T.J., Lu, H. & Al-Yaari, A. (2017). Rebuilding Long Time Series Global Soil Moisture Products Using the Neural Network Adopting the Microwave Vegetation Index. Remote Sensing 9(1), 35.  
  
Yao, P.P., Lu, H., Shi, J.C., Zhao, T.J., Yang K., Cosh, M.H., Gianotti, D.J.S., & Entekhabi, D. (2021). A long term global daily soil moisture dataset derived from AMSR-E and AMSR2 (2002-2019). Scientific Data, 8, 143 (2021). https://doi.org/10.1038/s41597-021-00925-8

7、Supporting project information

Second Tibetan Plateau Scientific Expedition Program  
National Key Research and Development Program of China  
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8、Data resource provider

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