A Big Earth Data Platform for Three Poles

**Daily all weather surface soil moisture data set with 1 km resolution in China (2003-2019)**

1、Description

Surface soil moisture (SSM) is a crucial parameter for understanding the hydrological process of our earth surface. Passive microwave (PM) technique has long been the primary choice for estimating SSM at satellite remote sensing scales, while on the other hand, the coarse resolution (usually >~10 km) of PM observations hampers its applications at finer scales. Although quantitative studies have been proposed for downscaling satellite PM-based SSM, very few products have been available to public that meet the qualification of 1-km resolution and daily revisit cycles under all-weather conditions. In this study, therefore, we have developed one such SSM product in China with all these characteristics. The product was generated through downscaling of AMSR-E and AMSR-2 based SSM at 36-km, covering all on-orbit time of the two radiometers during 2003-2019. MODIS optical reflectance data and daily thermal infrared land surface temperature (LST) that have been gap-filled for cloudy conditions were the primary data inputs of the downscaling model, in order to achieve the “all-weather” quality for the SSM downscaling outcome. Daily images from this developed SSM product have achieved quasi-complete coverage over the country during April-September. For other months, the national coverage percentage of the developed product is also greatly improved against the original daily PM observations. We evaluated the product against in situ soil moisture measurements from over 2000 professional meteorological and soil moisture observation stations, and found the accuracy of the product is stable for all weathers from clear sky to cloudy conditions, with station averages of the unbiased RMSE ranging from 0.053 vol to 0.056 vol. Moreover, the evaluation results also show that the developed product distinctly outperforms the widely known SMAP-Sentinel (Active-Passive microwave) combined SSM product at 1-km resolution. This indicates potential important benefits that can be brought by our developed product, on improvement of futural investigations related to hydrological processes, agricultural industry, water resource and environment management.

2、Keywords

Theme：soil moisture,Surface Water,Surface soil moisture,All-weather,Passive microwave remote sensing,Surface Freeze-thaw Cycle/state Remote Sensing,Soil moisture,Hydrology,Terrestrial Surface Remote Sensing
Discipline：Terrestrial Surface,Cryosphere
Places：China
Time：decade, Midnight

3、Data details

1.Scale：None

2.Projection：

3.Filesize：219128.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：54.0 | - |
| west：73.0 | - | east：135.0 |
| - | south：17.0 | - |

5、Time frame:2002-12-31 16:00:00+00:00--2019-12-30 16:00:00+00:00

6、Reference method

References to data:

ZHANG Yongqiang, SONG Peilin. Daily all weather surface soil moisture data set with 1 km resolution in China (2003-2019). A Big Earth Data Platform for Three Poles, doi:10.11888/Hydro.tpdc.2717622021

References to articles:

Song, P., Zhang, Y., Guo, J., Shi, J., Zhao, T., and Tong, B. (2022). A 1 km daily surface soil moisture dataset of enhanced coverage under all-weather conditions over China in 2003–2019, Earth Syst. Sci. Data, 14, 2613–2637, https://doi.org/10.5194/essd-14-2613-2022.

7、Supporting project information

National Natural Science Foundation of China
Open Fund of State Key Laboratory of Remote Sensing Science

8、Data resource provider

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