A Big Earth Data Platform for Three Poles

**Daily 1-km all-weather land surface temperature dataset for the Chinese landmass and its surrounding areas (TRIMS LST; 2000-2021)**

1、Description

Land surface temperature (LST) is one of the important parameters of the interface between the earth's surface and atmosphere. It is not only the direct reflection of the interaction between the surface and the atmosphere, but also has a complex feedback effect on the earth atmosphere process. Therefore, land surface temperature is not only a sensitive indicator of climate change and an important prerequisite for mastering the law of climate change, but also a direct input parameter of many models, which has been widely used in many fields, such as meteorology, climate, environmental ecology, hydrology and so on. With the deepening and refinement of Geosciences and related fields, there is an urgent need for all weather LST based on satellite remote sensing.
The generation principle of this dataset is a satellite thermal infrared remote sensing reanalysis data integration method based on a new land surface temperature time decomposition model. The main input data of the method are Aqua MODIS LST products and GLDAS data, and the auxiliary data include vegetation index and surface albedo provided by satellite remote sensing. The method makes full use of the high-frequency and low-frequency components of land surface temperature and the spatial correlation of land surface temperature provided by satellite thermal infrared remote sensing and reanalysis data, and finally reconstructs a high-quality all-weather land surface temperature data set.
The evaluation results show that this data set has good image quality and accuracy, which is not only seamless in space, but also highly consistent with the amplitude and spatial distribution of 1 km daily Aqua MODIS LST products widely used in current academic circles. When MODIS LST is used as reference, the mean deviation (MBE) of the data set is 0.08k to 0.16k, and the standard deviation of deviation (STD) is 1.12k to 1.46k. Compared with the daily 1km AATSR LST product released by ESA, the MBE and STD of the product are -0.21k to 0.25k and 1.27k to 1.36k during the day and night. Based on the measured data of 15 stations in Heihe River Basin, Northeast China, North China and South China, the test results show that the MBE is -0.06k to -1.17k, and the RMSE is 1.52k to 3.71k, and there is no significant difference between clear sky and non clear sky.
The time resolution of this data set is twice a day, the spatial resolution is 1km, and the time span is from 2000 to 2021; The spatial scope includes the main areas of China's land (including Hong Kong, Macao and Taiwan, excluding the islands in the South China Sea) and the surrounding areas (72 ° E-135 ° E，19 ° N-55 ° N）。 This dataset is abbreviated as trims LST (thermal and reality integrating modem resolution spatial sealing LST) for users to use. It should be noted that the spatial subset of trims LST, trims lst-tp (1 km daily land surface temperature data set in Western China, trims lst-tp; 2000-2021) V2) has also been released in the national Qinghai Tibet Plateau scientific data center to reduce the workload of data download and processing for relevant users.

2、Keywords

Theme：All-weather,Terrestrial Surface Remote Sensing
Discipline：Terrestrial Surface,Others
Places：Chinese landmass
Time：2000-2021

3、Data details

1.Scale：None

2.Projection：Albers

3.Filesize：1310720.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：55.0 | - |
| west：72.0 | - | east：135.0 |
| - | south：17.0 | - |

5、Time frame:1999-12-31 16:00:00+00:00--2021-12-30 16:00:00+00:00

6、Reference method

References to data:

TANG Wenbin, ZHOU Ji, MA Jin , ZHANG Xiaodong, ZHANG Xu, DING Lirong. Daily 1-km all-weather land surface temperature dataset for the Chinese landmass and its surrounding areas (TRIMS LST; 2000-2021). A Big Earth Data Platform for Three Poles, doi:10.11888/Meteoro.tpdc.2712522021

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Zhang, X., Zhou, J., Liang, S., Wang, D. (2021). A practical reanalysis data and thermal infrared remote sensing data merging (RTM) method for reconstruction of a 1-km all-weather land surface temperature. Remote Sensing of Environment, 260, 112437. https://doi.org/10.1016/j.rse.2021.112437.

Zhang, X., Zhou, J., Göttsche, F., Zhan, W., Liu, S., & Cao, R. (2019). A Method Based on Temporal Component Decomposition for Estimating 1-km All-Weather Land Surface Temperature by Merging Satellite Thermal Infrared and Passive Microwave Observations. IEEE Transactions on Geoscience and Remote Sensing, 57, 4670–4691. https://doi.org/10.1109/TGRS.2019.2892417

Zhou, J., Zhang, X., Zhan, W., Göttsche, F.-M., Liu, S., Olesen, F.-S., Hu, W., & Dai, F. (2017). A thermal sampling depth correction method for land surface temperature estimation from satellite passive microwave observation over barren land. IEEE Transactions on Geoscience and Remote Sensing, 55, 4743–4756. https://doi.org/10.1109/TGRS.2017.2698828

7、Supporting project information

A method to estimate all-weather LST based on the integration of multi-source remote sensing observations
Integration and Demonstration of Monitoring and Early Warning Technology and Equipment for Debris Flow in Complex Mountainous Areas
All-Weather Land Surface Temperature at High Spatial Resolution: Validation and Applications

8、Data resource provider

name: ZHANG Xiaodong
unit:
email: bobtennis@ sina.com

name: DING Lirong
unit: University of Electronic Science and Technology of China
email: dlryouxiang@163.com

name: ZHOU Ji
unit: University of Electronic Science and Technology of China
email: jzhou233@uestc.edu.cn

name: TANG Wenbin
unit:
email: geotalker@outlook.com

name: ZHANG Xu
unit: 电子科技大学资源与环境学院
email: xuzhang@uestc.edu.cn

name: MA Jin
unit: University of Electronic Science and Technology of China
email: jin.ma@uestc.edu.cn