A Big Earth Data Platform for Three Poles

**Daily 1-km all-weather land surface temperature dataset for Western China (TRIMS LST-TP; 2000-2021) V2**

1、Description

The Qinghai Tibet Plateau is a sensitive region of global climate change. Land surface temperature (LST), as the main parameter of land surface energy balance, characterizes the degree of energy and water exchange between land and atmosphere, and is widely used in the research of meteorology, climate, hydrology, ecology and other fields. In order to study the land atmosphere interaction over the Qinghai Tibet Plateau, it is urgent to develop an all-weather land surface temperature data set with long time series and high spatial-temporal resolution. However, due to the frequent cloud coverage in this region, the use of existing satellite thermal infrared remote sensing land surface temperature data sets is greatly limited.
Compared with the previous version released in 2019, Western China Daily 1km spatial resolution all-weather land surface temperature data set (2003-2018) V1, this data set (V2) adopts a new preparation method, namely satellite thermal infrared remote sensing reanalysis data integration method based on 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. This 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.
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 was used as the reference value, the mean deviation (MBE) of the data set in daytime and nighttime was -0.28 K and -0.29 K respectively, and the standard deviation (STD) of the deviation was 1.25 K and 1.36 K respectively. The test results based on the measured data of six stations in the Qinghai Tibet Plateau and Heihe River Basin show that under clear sky conditions, the data set is highly consistent with the measured LST in daytime / night, and its MBE is -0.42-0.25 K / - 0.35-0.19 K; The root mean square error (RMSE) was 1.03 ~ 2.28 K / 1.05 ~ 2.05 K; Under the condition of non clear sky, the MBE of this data set in daytime / night is -0.55 ~ 1.42 K / - 0.46 ~ 1.27 K; The RMSE was 2.24-3.87 K / 2.03-3.62 K. Compared with the V1 version of the data, the two kinds of all-weather land surface temperature show the characteristics of seamless (i.e. no missing value) in the spatial dimension, and in most areas, the spatial distribution and amplitude of the two kinds of all-weather land surface temperature are highly consistent with MODIS land surface temperature. However, in the region where the brightness temperature of AMSR-E orbital gap is missing, the V1 version of land surface temperature has a significant systematic underestimation. The mass of trims land surface temperature is close to that of V1 version outside AMSR-E orbital gap, while the mass of trims is more reliable inside the orbital gap. Therefore, it is recommended that users use V2 version.
The time span of this data set is from 2000 to 2021 and will be updated continuously; The time resolution is twice a day (corresponding to the two transit times of aqua MODIS in the daytime and at night); The spatial resolution is 1 km. In order to facilitate the majority of colleagues to carry out targeted research around the Qinghai Tibet Plateau and its adjacent areas, and reduce the workload of data download and processing, the coverage of this data set is limited to Western China and its surrounding areas (72 ° E-104 ° E，20 ° N-45 ° N）。 Therefore, this dataset is abbreviated as trims lst-tp (thermal and reality integrating modem resolution spatial seamless LST – Tibetan Plateau) for user's convenience.

2、Keywords

Theme：Thermal infrared remote sensing,Remote Sensing Technology
Discipline：Others,Remote Sensing Technology
Places：Western China, Tibetan Plateau
Time：2000-2021

3、Data details

1.Scale：None

2.Projection：Albers

3.Filesize：483850.24MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：45.0 | - |
| west：72.0 | - | east：104.0 |
| - | south：20.0 | - |

5、Time frame:1999-12-31 16:00:00+00:00--2021-12-31 15:59:59+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 Western China (TRIMS LST-TP; 2000-2021) V2. A Big Earth Data Platform for Three Poles, doi:10.11888/Meteoro.tpdc.2709532019

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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

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

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