A Big Earth Data Platform for Three Poles

**A combined Terra and Aqua MODIS land surface temperature and meteorological station data product for China (2003-2017)**

1、Description

Land surface temperature (LST) is a key variable for high temperature and drought monitoring and  
climate and ecological environment research. Due to the sparse distribution of ground observation stations, thermal infrared remote sensing technology has become an important means of quickly obtaining ground temperature over large areas. However, there are many missing and low-quality values in satellite-based LST data because clouds cover more than 60% of the global surface every day. This article presents a unique LST dataset with a monthly temporal resolution for China from 2003 to 2017 that makes full use of the advantages of MODIS data and meteorological station data to overcome the defects of cloud influence via a reconstruction model. We specifically describe the reconstruction model, which uses a combination of MODIS daily data, monthly data and meteorological station data to reconstruct the LST in areas with cloud coverage and for grid cells with elevated LST error, and the data performance is then further improved by establishing a regression analysis model. The validation indicates that the new LST dataset is highly consistent with in situ observations. For the six natural subregions with different climatic conditions in China, verification using ground observation data shows that the root mean square error (RMSE) ranges from 1.24 to 1.58 K, the mean absolute error (MAE) varies from 1.23 to 1.37 K and the Pearson coefficient (R2) ranges from 0.93 to 0.99. The new dataset adequately captures the spatiotemporal variations in LST at annual, seasonal and monthly scales. From 2003 to 2017, the overall annual mean LST in China showed a weak increase. Moreover, the positive trend was remarkably unevenly distributed across China. The most significant warming occurred in the central and western areas of the Inner Mongolia Plateau in the Northwest Region, and the average annual temperature change is greater than 0.1K (R>0:71, P<0:05), and a strong negative trend was observed in some parts of the Northeast Region and South China Region. Seasonally, there was significant warming in western China in winter, which was most pronounced in December. The reconstructed dataset exhibits significant improvements and can be used for the spatiotemporal evaluation of LST in high-temperature and drought-monitoring studies.  
More detail please refer to Zhao et al (2020). doi.org/10.5281/zenodo.3528024

2、Keywords

Theme：Surface Water,Thermal infrared,Water temperature,Terrestrial water storage anomaly,Forest Fire,Grassland interception,Extreme Precipitation,Natural Disaster,Atmosphere Remote Sensing,Disaster,Hydrology,land surface temperature  
Discipline：Atmosphere,Terrestrial Surface,Human-nature Relationship  
Places：China  
Time：2003-2017

3、Data details

1.Scale：500000

2.Projection：Albers

3.Filesize：473.33MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：53.33 | - |
| west：73.4 | - | east：135.0417 |
| - | south：3.52 | - |

5、Time frame:2002-12-31 16:00:00+00:00--2017-12-31 15:59:59+00:00

6、Reference method

References to data:

MAO Kebiao. A combined Terra and Aqua MODIS land surface temperature and meteorological station data product for China (2003-2017). A Big Earth Data Platform for Three Poles, doi:10.5281/zenodo.35280242020

References to articles:

Zhao, B., Mao, K.B., Cai, Y.L., Shi, J.C., Li, Z.L., Qin, Z.H., Meng, X.J., Shen, X.Y., and Guo, Z.H. (2020). A combined Terra and Aqua MODIS land surface temperature and meteorological station data product for China from 2003 to 2017，Earth Syst. Sci. Data, 12, 2555–2577. https://doi.org/10.5194/essd-12-2555-2020

7、Supporting project information

8、Data resource provider

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