A Big Earth Data Platform for Three Poles

**Global daily 0.05 ° spatiotemporal continuous land surface temperature dataset (2002-2020)**

1、Description

Land surface temperature (LST) is a key parameter in the study of surface energy balance. It is widely used in the fields of meteorology, climate, hydrology, agriculture and ecology. As an important means to obtain global and regional scale LST information, satellite (thermal infrared) remote sensing is vulnerable to the influence of cloud cover and other atmospheric conditions, resulting in temporal and spatial discontinuity of LST remote sensing products, which greatly limits the application of LST remote sensing products in related research fields.
The preparation of this data set is based on the empirical orthogonal function interpolation method, using Terra / Aqua MODIS surface temperature products to reconstruct the lst under ideal clear sky conditions, and then using the cumulative distribution function matching method to fuse era5 land reanalysis data to obtain the lst under all-weather conditions. This method makes full use of the spatio-temporal information of the original MODIS remote sensing products and the cloud impact information in the reanalysis data, alleviates the impact of cloud cover on LST estimation, and finally reconstructs the high-quality global 0.05 ° spatio-temporal continuous ideal clear sky and all-weather LST data set.
This data set not only realizes the seamless coverage of space-time, but also has good verification accuracy. The reconstructed ideal clear sky LST data in the experimental areas of 17 land cover types in the world, the average correlation coefficient (R) is 0.971, the bias (bias) is -0.001 K to 0.049 K, and the root mean square error (RMSE) is 1.436 K to 2.688 K. The verification results of the reconstructed all-weather LST data and the measured data of ground stations: the average R is 0.895, the bias is 0.025 K to 2.599 K, and the RMSE is 4.503 K to 7.299 K.
The time resolution of this data set is 4 times a day, the spatial resolution is 0.05 °, the time span is 2002-2020, and the spatial range covers the world.

2、Keywords

Theme：Thermal infrared remote sensing,Terrestrial Surface Remote Sensing
Discipline：Terrestrial Surface,Others
Places：Global
Time：2002-2020

3、Data details

1.Scale：None

2.Projection：WGS84

3.Filesize：814131.0MB

4.Data format：None

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：90.0 | - |
| west：180.0 | - | east：180.0 |
| - | south：90.0 | - |

5、Time frame:2001-12-31 16:00:00+00:00--2020-12-31 03:59:59+00:00

6、Reference method

References to data:

ZHAO Tianjie, YU Pei. Global daily 0.05 ° spatiotemporal continuous land surface temperature dataset (2002-2020). A Big Earth Data Platform for Three Poles, doi:10.11888/Meteoro.tpdc.2716632021

References to articles:

Yu, P., Zhao, T.J, Shi, J.C., Ran, Y.H., Jia, L., Ji, D.B., & Xue, H.Z. (2022). Global spatiotemporally continuous MODIS land surface temperature dataset. Scientific Data, 9, 143.

7、Supporting project information

CASEarth:Big Earth Data for Three Poles（grant No. XDA19070000）
Strategic leading science and technology project of Chinese Academy of Sciences (category A)

8、Data resource provider

name: ZHAO Tianjie
unit:
email: zhaotj@aircas.ac.cn

name: YU Pei
unit:
email: 211904020032@home.hpu.edu.cn