A Big Earth Data Platform for Three Poles

**Dataset of ground truth land surface evapotranspiration at the satellite pixel scale in the Heihe River Basin (from multi-station observations to satellite pixel scale) Version 1.0**

1、Description

Surface evapotranspiration (ET) is an important link of water cycle and energy transmission in the earth system. The accurate acquisition of ET is helpful to the study of global climate change, crop yield estimation, drought monitoring, and has important guiding significance for regional and even global water resources planning and management. With the development of remote sensing technology, remote sensing estimation of surface evapotranspiration has become an effective way to obtain regional and global evapotranspiration. At present, a variety of low and medium resolution surface evapotranspiration products have been produced and released in business. However, there are still many uncertainties in the model mechanism, input data, parameterization scheme of remote sensing estimation of surface evapotranspiration model. Therefore, it is necessary to use the real method. The accuracy of remote sensing estimation of evapotranspiration products was quantitatively evaluated by sex test. However, in the process of authenticity test, there is a problem of spatial scale mismatch between the remote sensing estimation value of surface evapotranspiration and the site observation value, so the key is to obtain the relative truth value of satellite pixel scale surface evapotranspiration.

Based on the flux observation matrix of "multi-scale observation experiment of non-uniform underlying surface evaporation" in the middle reaches of Heihe River Basin from June to September 2012, the stations 4 (Village), 5 (corn), 6 (corn), 7 (corn), 8 (corn), 11 (corn), 12 (corn), 13 (corn), 14 (corn), 15 (corn), 17 (orchard) and the lower reaches of January to December 2014 Oasis Populus euphratica forest station (Populus euphratica forest), mixed forest station (Tamarix / Populus euphratica), bare land station (bare land), farmland station (melon), sidaoqiao station (Tamarix) observation data (automatic meteorological station, eddy correlator, large aperture scintillation meter, etc.) are used as auxiliary data, and the high-resolution remote sensing data (surface temperature, vegetation index, net radiation, etc.) are used as auxiliary data. See Fig. 1 for the distribution map. Considering the land Through direct test and cross test, six scale expansion methods (area weight method, scale expansion method based on Priestley Taylor formula, unequal weight surface to surface regression Kriging method, artificial neural network, random forest, depth belief network) were compared and analyzed, and finally a comprehensive method (on the underlying surface) was optimized. The area weight method is used when the underlying surface is moderately inhomogeneous; the unequal weight surface to surface regression Kriging method is used when the underlying surface is moderately inhomogeneous; the random forest method is used when the underlying surface is highly inhomogeneous) to obtain the relative true value (spatial resolution of 1km) of the surface evapotranspiration pixel scale of MODIS satellite transit instantaneous / day in the middle and lower reaches of the flux observation matrix area respectively, and to observe through the scintillation with large aperture. The results show that the overall accuracy of the data set is good. The average absolute percentage error (MAPE) of the pixel scale relative truth instantaneous and day-to-day is 2.6% and 4.5% for the midstream satellite, and 9.7% and 12.7% for the downstream satellite, respectively. It can be used to verify other remote sensing products. The evapotranspiration data of the pixel can not only solve the problem of spatial mismatch between the remote sensing estimation value and the station observation value, but also represent the uncertainty of the verification process. For all site information and scale expansion methods, please refer to Li et al. (2018) and Liu et al. (2016), and for observation data processing, please refer to Liu et al. (2016).

2、Keywords

Theme：Evapotranspiration,Hydrology
Discipline：Terrestrial Surface
Places：Heihe River Basin, Flux observation matrix in the middle and lower reaches
Time：2012-2015

3、Data details

1.Scale：None

2.Projection：

3.Filesize：0.7MB

4.Data format：数据格式，例如 excel

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：38.86 | - |
| west：100.33 | - | east：100.36 |
| - | south：38.83 | - |

5、Time frame:2012-06-24 16:00:00+00:00--2016-01-15 13:00:00+00:00

6、Reference method

References to data:

LIU Shaomin, XU Ziwei, LI Xiang . Dataset of ground truth land surface evapotranspiration at the satellite pixel scale in the Heihe River Basin (from multi-station observations to satellite pixel scale) Version 1.0. A Big Earth Data Platform for Three Poles, doi:10.11888/Meteoro.tpdc.2701422019

References to articles:

Li, X., Liu, S.M., Li, H.X., Ma, Y.F., Wang, J.H., Zhang, Y., Xu, Z.W., Xu, T.R., Song, L.S., Yang, X.F., Lu, Z., Wang, Z.Y., Guo, Z.X. (2018). Intercomparison of six upscaling evapotranspiration methods: From site to the satellite pixel. Journal of Geophysical Research: Atmospheres, 123(13), 6777-6803. https://doi.org/10.1029/2018JD028422.

Liu, S.M., Xu, Z.W., Song, L.S., Zhao, Q.Y., Ge, Y., Xu, T.R., Ma, Y.F., Zhu, Z.L., Jia, Z.Z., Zhang, F. (2016). Upscaling evapotranspiration measurements from multi-site to the satellite pixel scale over heterogeneous land surfaces. Agricultural and Forest Meteorology, 230-231, 97-113. doi:10.1016/j.agrformet.2016.04.008.

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7、Supporting project information

the National Natural Science Foundation of China “Key Theory and Methods for Validation of Land Surface Remote Sensing Products”

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