A Big Earth Data Platform for Three Poles

**Dataset of ground truth of land surface evapotranspiration at regional scale in the Heihe River Basin (2012-2016) ETMap Version 1.0**

1、Description

Surface evapotranspiration (ET) is an important variable that connects the land energy balance, water cycle and carbon cycle. The accurate acquisition of ET is helpful to the research of global climate change, crop yield estimation, drought monitoring, and it is of great significance to regional and global water resource planning and management. The methods of obtaining evapotranspiration mainly include ground observation, remote sensing estimation, model simulation and assimilation. The high-precision surface evapotranspiration data can be obtained by ground observation, but the spatial representation of observation stations is very limited; remote sensing estimation, model simulation and assimilation methods can obtain the spatial continuous surface evapotranspiration, but there are problems in the verification of accuracy and the rationality of spatial-temporal distribution pattern. Therefore, this study makes full use of a large number of high-precision station observation data, combined with multi-source remote sensing information, to expand the observation scale of ground stations to the region, to obtain high-precision, spatiotemporal distribution of continuous surface evapotranspiration.
Based on the "Heihe River Integrated Remote Sensing joint experiment" (water), "Heihe River Basin Ecological hydrological process integrated remote sensing observation joint experiment" (hiwater), the accumulated station observation data (automatic meteorological station, eddy correlator, large aperture scintillation instrument, etc.), 36 stations (65 station years, distribution map is shown in Figure 1) are selected in combination with multi-source remote sensing data (land cover) Five machine learning methods (regression tree, random forest, artificial neural network, support vector machine, depth belief network) were used to construct different scale expansion models of surface evapotranspiration, and the results showed that: compared with The other four methods, random forest method, are more suitable for the study of the scale expansion of surface evapotranspiration from station to region in Heihe River Basin. Based on the selected random forest scale expansion model, taking remote sensing and air driven data as input, the surface evapotranspiration time-space distribution map (etmap) of Heihe River Basin during the growth season (May to September) from 2012 to 2016 was produced. The results show that the overall accuracy of etmap is good. The RMSE (MAPE) of upstream (las1), midstream (las2-las5) and downstream (las6-las8) are 0.65 mm / day (18.86%), 0.99 mm / day (19.13%) and 0.91 mm / day (22.82%), respectively. In a word, etmap is a high-precision evapotranspiration product in Heihe River Basin, which is based on the observation data of stations and the scale expansion of random forest algorithm. Please refer to Xu et al. (2018) for all station information and scale expansion methods, and Liu et al. (2018) for observation data processing.

2、Keywords

Theme：Evapotranspiration,Atmospheric Water Vapor
Discipline：Atmosphere
Places：Heihe River Basin
Time：2012-2016

3、Data details

1.Scale：None

2.Projection：None

3.Filesize：1.49MB

4.Data format：数据格式，例如 excel

4、Space scope

|  |  |  |
| --- | --- | --- |
| - | north：42.7 | - |
| west：97.0 | - | east：102.0 |
| - | south：37.8 | - |

5、Time frame:2012-01-13 16:00:00+00:00--2017-01-12 16:00:00+00:00

6、Reference method

References to data:

LIU Shaomin, XU Tongren . Dataset of ground truth of land surface evapotranspiration at regional scale in the Heihe River Basin (2012-2016) ETMap Version 1.0. A Big Earth Data Platform for Three Poles, doi:10.11888/Meteoro.tpdc.2701412019

References to articles:

Xu, T.R., Guo, Z.X., Liu, S.M., He, X.L., Meng, Y.F.Y., Xu, Z.W., Xia, Y.L., Xiao, J.F., Zhang, Y., Ma, Y.F, Song, L.S. (2018). Evaluating Different Machine Learning Methods for Upscaling Evapotranspiration from Flux Towers to the Regional Scale. Journal of Geophysical Research: Atmospheres, 123(16), 8674-8690. doi: 10.1029/2018JD028447.

Liu, S., Li, X., Xu, Z., Che, T., Xiao, Q., Ma, M., Liu, Q., Jin, R., Guo, J., Wang, L., Wang, W., Qi, Y., Li, H., Xu, T., Ran, Y., Hu, X., Shi, S., Zhu, Z., Tan, J., Zhang, Y., Ren, Z. (2018). The Heihe Integrated Observatory Network: A basin‐scale land surface processes observatory in China. Vadose Zone Journal, 17,180072. https://doi.org/10.2136/vzj2018.04.0072.

刘绍民, 贾贞贞, 徐同仁, 马燕飞, 周会珍, 李新, 徐自为, 张圆, 宋立生, 姚云军, 刘照言. (2021). 国家标准《地表蒸散发遥感产品真实性检验》. GB/T 40033-2021.

7、Supporting project information

8、Data resource provider

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