

Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on **essd-2022-171**

Anonymous Referee #2

Referee comment on "A global terrestrial evapotranspiration product based on the three-temperature model with fewer input parameters and no calibration requirement" by Lei Yu et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-171-RC2>, 2022

This manuscript uses the classic 3T model to generate global terrestrial evapotranspiration (ET) product at 0.25 degree resolution and 3hour temporal resolution. I am glad to see the 3T model has been expended to a global scale. The authors also tested their estimates against flux observations at a monthly scale and water balance ET estimates at an annual scale. Overall, the paper is well written, and the key message is get crossed. Having said that, I have some major concerns on the method applied to the global scale, and validation processes. Follows are the key concerns:

- The author grouped the climate regimes into 5 groups according to Koppen-geiger climate classification, then assumes the means of reference net radiation values of the soil and vegetation components are similar within the same group of samples. I am afraid that the classification is too coarse, which will result in large uncertainty in estimating the two important parameters. I think the more details should be exhibited and the uncertainty should be quantified.
- The validation of the 3T products is a bit weird. The benefit to use the 3-T model is to detect ET variation in a short period of time. Considering that the 3-T products has been run at 3-hour temporal scale, its robustness should be demonstrated at 3-hour or daily scale at least. Currently, the authors focused their validations against flux measurements at a monthly scale, which is too coarse to be acceptable.
- Calculation of water balance ET can be improved. The authors used GLDAS forcing data to drive the 3T model. However, the calculation of water balance ET relies on another precipitation product GPCC. I think the authors need to test the consistency between GLDAS precipitation and GPCC precipitation. In addition, I encourage the authors not only test its performance at a mean annual scale, but also need to test its interannual variability. This will demonstrate its full strength.

In conclusion, the authors had a good attempt to generate global ET product based on the 3T model. However, its robustness has not been fully demonstrated. There are numerous ET products available across the globe. The readers will wonder why this one should be

deserved to be published in ESSD. To demonstrate its strength, I suggest the authors put more efforts for validations in arid semi-arid regions and in short period of time. They can show some particular case under extreme drought conditions, i.e. comparing its performance with others in the extreme climatic conditions.