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Comment on essd-2022-195

Anonymous Referee #1

Referee comment on "Long-term monthly 0.05° terrestrial evapotranspiration dataset (1982–2018) for the Tibetan Plateau" by Ling Yuan et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-195-RC1, 2022

This manuscript generated a long-time evapotranspiration (ET) datasets, including its three components, for the arid and cold areas of the Tibetan Plateau. The intent of the manuscript is worthy and significant, and the topic generally fits the scope of Earth System Science Data. However, I'm afraid the paper still requires thoroughly editing to reach the level of international publications and before publication is granted. One major concern is that the ET estimation methods were not clear enough, i.e., the MOD16-STM was an existing algorithm, what's your contribution? If introducing soil moisture is, how about the estimates without using soil moisture? Furthermore, the validation is somewhat weird. Particularly the components did not perform any validation or the proposed products did not compare to any existing ET products.

Major concerns:

- Introduction section. Although the introduction section was well written, it's unclear why the authors perform this study. I would encourage the authors to directly point out the challenges that the present ET products have, rather than stating a lack of long-term remote sensing ET products (which is not true). Give a clear message to the reader what are the critical problems in the studied topic, why you did the study, and what problem(s) will be solved in the current study.
- Method section. The authors use a two source PM equation. However, they did not sperate rs and rc (Eqs. 1 to 3). In fact, these two resistances as well as resistance for wet canopy (interception) are estimated using different methods in MOD16, but they were estimated in the same way in this study. In addition, the input datasets have different temporal scales and how did you deal with the problem (or model simulation at what kind of temporal scale)? It is also unclear how the estimates were validated. For example, at half-hour or daily scale? How to match the EC tower data with the pixel?
- Results section. I'm somewhat confused by the results shown in figure 5, particularly the ET and its component in forest land. The ET can be high as greater than 700 mm,

but the Ec looks like only around 150 mm. Could you show some published data to justify the estimates? Moreover, how accurate is the Ei comparing to the other results (e.g., Zheng's product)? In section 3.4, could you show some comparisons between your estimates and the other products (e.g., using plots)?

- Discussion section. In 4.2, insightful discussion is missing. For example, in ET estimation, a lot of empirical coefficients were used, did they cause any uncertainty?

Specific comments

- Line 68. What did you mean by using "the remote nature of the TP"?
- Line 77-99. It mentioned that "It is also difficult to separate and validate the ET components effectively." Maybe a comprehensive validation of the ET components is needed to prove that this challenge has been overcome in this dataset. Otherwise, the product does not solve the problem mentioned in the introduction section: "Interestingly, there are significant differences in the global and regional contributions of the Es, Ec, and Ei even if the total ET estimates are consistent across different products (Lawrence et al., 2007; Blyth and Harding, 2011; Miralles et al., 2016)."
- Figure 1. It is better to use different color for each panel. Where are these data from?
- Line 82-83. "The MOD16 algorithm is also used to separately estimate…" may be better.
- The authors claim that the new ET product exhibited acceptable performance on the TP based on nine flux towers. Overall, it is agree well with the flux tower ET (Figure 3j), but overestimation occurred at lower ET rates and underestimation at larger ET rates (obviously in Figures 3d, e, f, i). It is better to give some explanation and make insightful discussion (or improvement).
- Is it necessary to use a question for a section title?
- I'm quite confused by using the MOD16-STM. What does STM mean (or abbreviation for what)?
- In the following paragraph, the writing style of T* was varied. Please unify them.
- Although the 18 ET products are proved with accept accuracy, they show a large uncertainty in both trends and averaged ET on the TP. To compare their performances on the TP, it is suggested to compare the averaged ET from these products to the EC measurements (i.e., monthly and annual scales) and water balance method.
- Be careful when using "very", for example Lines 37, 63, 277, 361, etc.
- Figure 4. It is unclear which data is observation and which is observation.
- Figure 5. What does Ew mean?
- Figure 10. The legends include CR-Ma, while it is not shown in the figure.
- It seems the conclusion is too long.