Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on essd-2022-195

Anonymous Referee #2

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-RC2, 2022

Review Comments of "A monthly 0.01° terrestrial evapotranspiration product (1982-2018) for the Tibetan Plateau" by Yuan et al.

The manuscript (MS) provides a long-term ET dataset over the Tibetan Plateau, a region that is known as "Asian Water Tower" because it is the source region of a few large Asian rivers. For this reason, accurate information of ET is particularly important. I very much appreciate the considerable efforts made by the authors to the ET community, as shown by not only this gridded dataset but also the eddy-covariance flux observations in Tibetan Plateau. The latter was published by these authors in also ESSD in 2020 (https://doi.org/10.5194/essd-12-2937-2020), which has been widely used by the community to improve the understanding of hydrological and climatological processes in the Tibetan Plateau. The present MS is an obviously big step forward upon the previous one, which is also definitely significant for understanding the land surface processes in the Third Pole Region.

The MS is generally well organized and I suggest "Minor Revision".

I have two main concerns:

- The authors stated their new ET dataset is at 0.01 degree. However, the best resolution of the inputs (Table 1) is just 0.05 degree and this is only for albedo and NDVI, others are even coarser. Usually, for any models (not only ET models), the resolution of model's output cannot exceed the best resolution of inputs, otherwise it becomes simple "resampling" of the data (e.g., nearest neighbor or bilinear interpolation). This does not make sense since it cannot bring new spatial information. Therefore, I think the best resolution of this new ET dataset from their model can only be 0.05 degree.
- There have been a great number of studies that reported Tibetan Plateau is greening. This is not surprised because warming and wetting in recent decades may promote vegetation growth in such a cold and dry region. However, the NDVI significantly decreased after 2000 in Fig 9a, while warming (Fig 9b) and wetting (Fig 9e) are still seen for this period. This seems different with the NDVI reported in Wang et al. (2022). Because NDVI is a key input of the model that determines both canopy transpiration and soil evaporation (fc in the Equations 1 and 2), I would suggest the authors to test if other NDVI datasets (perhaps even other leaf area index data?) also show similar interannual variations and how ET varied if they are also used in the modeling, otherwise the trends in transpiration and soil evaporation in the MS should be interpreted with caution.

I have further line-by-line comments below:

Ln61: Here the Immerzeel et al. 2010 Science paper should be cited since this paper is perhaps the first one that proposed Asian Water Tower concept?

Ln75: Please delete the "pan evaporation" studies here since they are not really relevant to the present topic—ET.

Ln76-77: Please do not combine EC and reanalysis into one sentence. I would suggest moving reanalysis to the previous sentence since it belongs to “dataset”. However, EC is a kind of ground observation and is much more valuable/reliable than above “datasets”, which should be specially highlighted.

Ln144: Please show how fc is derived from NDVI.

Ln195: Prec is not shown in Tabel 1?

Ln199-201: Please show the source reference and website of the NDVI dataset.

Ln205: The emissivity data is not shown in Table 1? Please also show the resolution for it.

Table 2: I suggest adding the reference for each EC flux observation station in the Table 2. Also, the land cover type is not clear for BJ, does it belong to grassland?

Ln297-298: This point is important, but different precipitation products may produce different ratios of ET to precipitation. Did you test other datasets? I am not fully convinced by the reanalysis Prec product (especially in TP). Please also consider other Prec data, e.g., CMFD, TPHiPr (Jiang et al., 2022), and the latest gauge-satellite merged product GPCP Version 3.2 released in this year, etc. This suggestion also applies to Figure 9f because the lakes in TP continued to rapidly expand after 2000, but Prec from the current Figure 9f even decreased. Please see Fig 4e and Fig 6 in Zhang et al. (2020).

Ln330: What is the difference between "wetting" and "increased precipitation"? The "wetting" occurs many times throughout the MS…. I assume you mean the increased soil moisture? Please state clearly.

Figure 9: Please show the specific periods for different slopes shown in the Figure 9?

Ln430: "evaporated" from the entire TP.

Ln432: Please add the p value also for the significant decreasing trend.

Appendix A: I do not know whether ESSD allows Online Supplementary Materials. If so, I suggest moving all tables and figures in Appendix to Online Supplementary Materials. There is no need to show them (some are even out of TP) in this MS.

References:

Immerzeel, W. W., et al. 2010. Climate change will affect the Asian water towers. Science. https://www.science.org/doi/abs/10.1126/science.1183188

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Wang, Y., et al., 2022. Grassland changes and adaptive management on the Qinghai–Tibetan Plateau. Nature Reviews of Earth & Environment. https://www.nature.com/articles/s43017-022-00330-8

Wei, Z., et al., 2017. Revisiting the contribution of transpiration to global terrestrial evapotranspiration. Geophysical Research Letters. https://doi.org/10.1002/2016GL072235

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