

Editor:

Both reviewers were satisfied with the revision. But before acceptance, there are still some presentations problems need to be revised.

Response: Thank you very much for your consideration. We are grateful to the reviewer for the very helpful comments.

Reviewer 1:

This study assessed global ET trend through four ET datasets, and quantified the contributions of climatic variables to ET changes through the Budyko control experiment. The results clarify that precipitation, radiation and VPD are the main drivers of evapotranspiration variability and regional characteristics were also generalized. The article has reliable data, reasonable analysis, and detailed uncertainty analysis, but some presentation problems need to be revised.

Response: We thank this reviewer for some presentation suggestions, which significantly improves the quality of the manuscript. The following is our detailed responses to the reviewer's comments.

1. The quality of the introduction needs to be improved. The authors need to strengthen the structural logic and avoid the presentation of a list of previous studies, instead using a critical review.

Response: Thank you for your comment.

We have already read the introduction, carefully. We have rewritten the research significance part of introduction, such as *“Along these lines, Li et al (2021) attempted to quantify the contribution of those forcing variables to ET trends over China with the Budyko theory. However, there are still unclear questions about the global land ET mechanism. For example, how differently would the conclusions of dominating ET factors over water-limited regions be for global dry lands? Which variable controls ET over the global tropical zone is unclear, despite the results of VPD controlling ET over the energy-limited region of China. Which variable controls ET over the boreal region is unclear. For example, Precipitation, air temperature, and radiation control Amazon's ET changes (Pan et al., 2020), while significantly increased ET in the humid region mostly results from increasing air temperature (Wang et al., 2022). For boreal region, increasing air temperature is significantly correlated with ET (Wang et al., 2022), while increasing VPD contributes to ET process (Helbig et al., 2020). Therefore, it is necessary to assess global ET mechanisms using the same attribution method for solving these problems”* in Line 28-37 of page 2.

2. P2 Line10, “Those results have indicated that the improper choice of ET models and forcing data may add significant uncertainties to the ET attributions.”: “improper” is probably not the right word.

Response: Thank you for your comment.

The word “improper” has been changed to the word “inappropriate”. Please see line 14 in page 2.

3. P2 Line 15, “Studies have indicated that increased VPD primarily determines the recent PET increase, a function of air temperature and humidity (Dai et al., 2017; Ficklin et al., 2017). Increased VPD tends to make plants close their stomata to avoid water loss and thus restrain transpiration (Novick et al., 2016; McAdam et al., 2015).”: It does not read well and lacks connecting words.

Response: Thank you for your comment.

We have added a connecting word “however” in Line 17-20 of page 2, such as “*Studies have indicated that increased VPD primarily determines the recent PET increase, which is a function of air temperature and humidity (Dai et al., 2017; Ficklin et al., 2017), however increased VPD tends to make plants close their stomata to avoid water loss and thus restrain transpiration (Novick et al., 2016; McAdam et al., 2015)*”.

4. P2 Line 20, “Li et al. (2021) have found VPD has dominated the increase of annual ET in energy-limited regions such as southeastern China.”: This sentence lacks connection with the previous one.

Response: Thank you for your comment.

We have added a connecting sentence in Line 21-22 of page 2, such as “Therefore, it is very important to clarify how VPD affects long-term ET changes”.

5. P12 Line 20, “Those studies indicate that contribution of climatic variables have(has) already included information of vegetation, indirectly.” may be misleading. The authors describe **the ET database as static in terms of land use, indicating that this study does not consider the contribution of land use change, as stated in the next paragraph**. If the authors are trying to show that land use has a limited impact, they can refer to this article (Hoek van Dijke A J, Herold M, Mallick K, et al. Shifts in regional water availability due to global tree restoration[J]. Nature Geoscience, 2022, 15(5): 363-368.).

Response: Thank you for your comment and sharing paper.

We have already read this paper, carefully. And, we have changed the sentence in Line 23-24 of page 12 to “Those studies indicate that vegetation influences on ET already contain the signal of climatic variables, which are essential for vegetation growth”.