

Author's Response

Paper Number: ACP-2021-976

Paper Title: Evaluation of tropical water vapour from CMIP6 GCMs using the ESA CCI "Water Vapour" climate data records

We thank the editor for the comments on our manuscript. Please find below our response and corresponding changes made in the revised paper. We hope that we satisfyingly addressed the comment, and that the manuscript will be now suited for publication.

Sincerely,
On behalf of all authors,
Jia He

Editor

Comments to the author:

Dear Jia He and co-authors,

your paper is accepted for publication in ACP with a minor point to be discussed.

I have a last question/recommendation: regarding the last comments of Ref. #3 on the data sampling issue and potential mismatch in large-scale atmospheric circulation between daily and monthly time scales, I see no changes in the manuscript - though these seem to be points of discussion - but also no argument why this was not done? You might provide an argument, or, what I would recommend, briefly address these potential errors in the manuscript.

Reply: Thank you very much for this comment. We have now added the following paragraph in the manuscript for clarification purpose:

L72: The daily water vapour data and monthly mean ω_{500} are adopted in our analysis for several reasons. Firstly, our intention is to evaluate the datasets with the highest temporal resolution, as the temporal averaging will mask out the extremes and the PDFs would have been smoothed. Secondly, the cloud condition varies significantly over short time scales, therefore, quantification at high temporal resolution is required. Last but not least, the previous study suggests that the ω_{500} is sensitive to local dynamics and subject to significant biases at the instantaneous scale (Trenberth et. al, 2000). Research shows that the ω_{500} data with shorter time scales are unreliable (Höjgård et al., 2020). The monthly vertical motion can represent a mixture of ascending and descending atmospheric conditions. It is worth mentioning that by adopting the monthly mean of ω_{500} in our evaluation, the fluctuations of shorter time scales, where small-scale convection probably dominates, are ignored.