

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-697

Anonymous Referee #2

Referee comment on "A vertical transport window of water vapor in the troposphere over the Tibetan Plateau with implications for global climate change" by Xiangde Xu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-697-RC2>, 2021

Review of the manuscript "A vertical transport window of water vapor in the troposphere over the Tibetan Plateau with implication for global change" by Xu et al.

General comments:

This paper investigates the effects of the Tibetan Plateau on the water vapor transport in the atmosphere and found that a summertime "hollow wet pool" and a vertical transport window exist in the troposphere over the Tibetan Plateau (TP) which have significant impacts on the global water vapor distribution. The results presented in this study are interesting and the content of the manuscript is well within the scope of ACP. However, the manuscript needs some revisions before it is accepted for publication in ACP.

Major comments:

- My first concern is about the causal relationship. Based on the correlation analysis, the authors argued that the effect of TP's vertical transport window of tropospheric vapor have impacts on global water vapor distribution, even the remote regions like the Arctic, Antarctic. However, correlation analysis alone can not reveal the causal relationship. I would suggest a model simulation with a passive tracer released over the TP to verify transport pathways of water vapor over the TP as suggested by the correlation analysis.
- Another issue is the role of the TP's thermal effect on the formation of the transport channel of the water vapor. It is proposed in the manuscript that the TP's thermal effect could make a strong warm wet vapor transport channel connecting the water vapor source in the low latitude tropical ocean. This conclusion is again drawn mostly from correlation analysis. Is it possible to do a few sensitivity experiments with a numerical model to verify that the proposed transport channel is indeed forced or

maintained by the apparent heat source of the TP? Alternatively, it is better to perform a composite analysis with respect to high and low Q to see whether this transport channel will change with Q.

Some minor comments:

- Title: 'global change' covers a relatively wide discipline. I would suggest change it to 'global climate change'.
- Line 41: 'The observed "CISK-like mechanism' may need a reference.
- Line 65: 'not enough attention' >> 'inadequate attention'
- Line 71: What is the meaning of 'special column constructor'?
- Page 5: some letters and symbols in the text which are used in the formulas should be italics.
- Line 103: 'productions' >>'products'
- Line 134-135: which variable can represent 'convective cloud activities'?