

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2021-461

Anonymous Referee #2

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Referee comment on "Eastward-propagating planetary waves in the polar middle atmosphere" by Liang Tang et al., Atmos. Chem. Phys. Discuss.,  
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### General comments

The study presents the global variations of eastward propagating planetary waves of wavenumbers 1, 2, 3, and 4 and their surrounding conditions in terms of background wind and baroclinic/barotropic instability. While the study contains great potential for the research of planetary waves and significant findings, the motivation and research questions are rather weak compared to the description of state-of-the-art and results. To present a study of the global variation of planetary-wave activity for the first time does not reach the required novelty. It corresponds to the fact that the authors should invest more time to improve the overall presentation and the language more precise. Please see more specific and technical comments below.

### Specific comments

Due to the extensivity and focus of the study, I would appreciate an adoption of Open Science approaches to allow reproduce the extensive analysis in this study (e.g. Laken, 2016). In particular, I would recommend any kind of willingness of the authors to publish the code allowing to reproduce the figures in the paper. There are multiple ways how to proceed, either to allow the access upon request or via portals allowing to assign Digital Object Identifier (DOI) to the research outputs, e.g. ZENODO. I think it could enhance the quality and reliability of this publication. In the end, this publication might be motivating for future middle atmosphere studies.

Authors should consider using a diverging colormap in Figure 2 to clearly differentiate between positive and negative values (Zeller and Rogers, 2020).

To improve Figure 4 and its successors deserve improvements in terms of description and graphical representations of EP fluxes. The size of the arrows may need to be increased. Using vector figures instead of raster ones may help to differentiate details as well.

Is there any reason why only one year was analysed? Would you expect any differences between reanalysis datasets in terms of your results? The same one-year analysis may be done based on the ERA5 reanalysis.

### **Technical comments**

I58 switch position of "long-term" and "observed"

### **References**

Laken, B. A. (2016). Can Open Science save us from a solar-driven monsoon? *Journal of Space Weather and Space Climate*, 6, A11. <http://doi.org/10.1051/swsc/2016005>  
Zeller, S., and D. Rogers (2020), Visualizing science: How color determines what we see, *Eos*, 101, <https://doi.org/10.1029/2020EO144330>. Published on 21 May 2020.