

We thank the reviewers and editors for their constructive comments on our manuscript. The manuscript is revised thoroughly by considering all the comments. Besides, Figures 2, 4, 5, 6, 7, 9, 10, and 11 have been updated to make the results clearer. Besides, the language is polished by the Edit Springs English editing service. Our responses to every comment are listed below with blue.

Response to Anonymous Referee 2

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.

All the MATLAB codes and data used for the analysis in this study are available at <http://hdl.pid21.cn/21.86116.7/04.99.01293>.

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

In the revision, the eastward and westward winds are distinguished by dotted and solid lines, respectively. Besides, the zero line is also highlighted, which makes it much easier to differentiate eastward and westward wind.

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.

More descriptions on the analysis results are added in the revision. The arrow size for EP flux have also been increased.

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.

This paper focuses the seasonal variations of the eastward wave modes in the polar stratosphere. In fact, we also checked the wave events during other years, and we found that the four waves modes, e.g., E1, E2, E3 and E4, are all representative during 2019. Thus, the analysis results during 2019 are presented. The inter-annual variations and the corresponding mechanisms would be investigated next.

It is a pity that we do not have the whole ERA5 dataset currently. And it may take a much longer time to download the whole ERA5 dataset to reproduce all the figures in the manuscript. We downloaded the temperature data during July and August of 2019 and found that the analysis results are roughly consistent with MERRA2. In the future, we would perform more comparisons between these two reanalysis datasets.

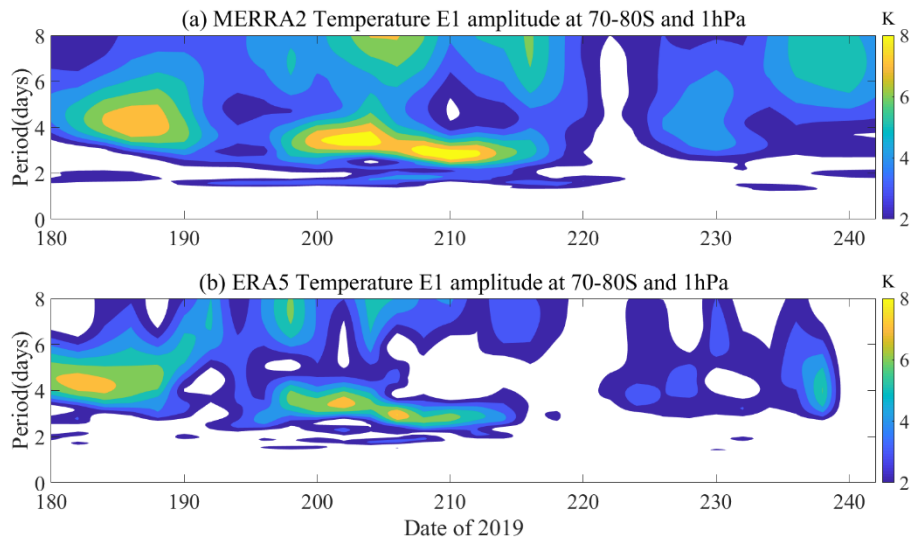


Figure S1. The comparison of the temperature spectra with eastward wavenumber 1 between (a) MERRA2 and (b) ERA5.

Technical comments

158 switch position of “long-term” and “observed”

Revised in the revision.

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.