

Interactive comment on “Seasonal evolution of winds, atmospheric tides and Reynolds stress components in the Southern hemisphere mesosphere/lower thermosphere in 2019” by Gunter Stober et al.

Gunter Stober et al.

gunter.stober@iap.unibe.ch

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General comment:

Anonymous Referee #2

This paper describes an approach to obtain wind variances and momentum fluxes. In which an adaptive spectral filter has been used to perform the Reynolds decomposition into a background flow and the GW fluctuations. The authors have used winds obtained during 2019 by 6 meteor radars from middle to polar latitudes in southern hemisphere.

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To reduce the meteor altitude uncertainty, a full earth geometry was implemented, which maximize the observed number of meteors in the analysis. The topic covered in the manuscript is important as it contributes to improving the momentum flux and variance estimates in MLT region winds. The arguments used to interpret the results are not clear and sometimes not convincing. The scientific contribution is appropriate for this journal. However, there are some issues that need to be addressed.

General Reply:

We thank the reviewer for his comments and suggestions. During the preparation of the manuscript, we emphasized on the technical details, which somehow led to a too short discussion of some scientific aspects. In response to these comments, we expanded the scientific discussion in the suggested context. All changes of the manuscript will be indicated by latexdiff.

Comments:

In the "Introduction", some sources of secondary gravity waves have been emphasized, so it was expected that the authors would also explore this knowledge in the results as well as in the discussion. In this sense, there is a lack of enough discussion about this topic. Some parts of the description of the Reynolds stress results are confusing.

Reply:

We appreciate this suggestion and expand the discussion for the Antarctic Peninsula and McMurdo as these non-primary waves show remarkably agreement with the observed momentum fluxes and variances. The 2D ASF seems to be very suitable to provide a much better filtering for non-primary waves compared to temporal-only filters.

Comment:

For example: Line 399 - "In Particular, at KSS a variable zonal momentum flux is measured that seems to be in better agreement with TDF and ROT results". For me, it

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is hard to see a better agreement among KSS and TDF/ROT results, from Figure 8.

Reply:

This point is also related to a comment from reviewer #1 and following both reviewers' suggestion, we sorted the figures with respect to each meteorological parameter for each station, which enables a more straightforward inter-station comparison. This was accompanied by changing the order of some related paragraphs to keep a logical order between the Figures and the text.

Comment:

Lines 404-405 - For the “results from KSS and KEP show a good agreement of the vertical structure ...”, from the Figure 8, I can see that a good agreement occur above 90 km.

Reply:

This sentence was rephrased.

Comment:

Lines 405-407 - where appear “Results from ROT and DAV still reflect some features of the seasonal meridional momentum flux behaviour,” again, from the Figure 8 it is possible to see that KEP “still reflect some features of ...” - instead of DAV. Discussion should be made more rigorous. The basis for these statements need to expand further, considering the stratospheric and MLT winds (Figures 10 and 2) to explain the momentum flux components and variations observed (Figures 8 and 9). What configurations are expected for momentum flux in face of the observed stratospheric and MLT winds

Reply:

We added a paragraph to discuss in more detail the observed momentum fluxes and wind variances with respect to the observed mean winds in 2019 for the different stations.

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Technical revision

Comment:

Line 23: Change (Fritts and Nastrom (1992) by “Fritts and Nastrom (1992)”

Reply:

Done.

Comment:

Line 26: “ch” and “Uh” don’t seem necessary.

Reply:

Done.

Comment:

Lines 398-399: change “In Particular, at KSS a” by “In particular, at KSS a”

Reply:

Done.

Comment:

Lines 471 and 473: it is unnecessary to use the acronym USLM

Reply:

Done.

Comment:

Line 496: change “structure Becker and Vadas (2018) with” by “structure (Becker and Vadas, 2018) with”

Reply:

Done.

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2020-55>, 2020.

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