

Interactive comment on “Mesospheric winds measured by MF radar with Full Correlation Analysis: error properties and impacts on studies of wind variance” by Maude Gibbins and Andrew Kavanagh

Anonymous Referee #1

Received and published: 31 December 2019

The paper entitled “Mesospheric winds measured by MF radar with Full Correlation Analysis: error properties and impacts on studies of wind variance” by Gibbins and Kavanagh has for purpose to determine what could be the sources of errors measured by MF radars in Antarctica. The main result is that the occurrence of velocity outliers and the width of the velocity distribution recorded by MF radar have been possibly wrongly attributed to the influence of gravity waves but could be more likely be attributed to the anisotropic received signal pattern of the radar. The paper also states that the magnitude of the error distribution is related to solar insolation and geomagnetic activity.

C1

Although the paper is showing interesting initial results which seem physically meaningful, the paper is quite brief and some sections are not always fully described nor the figures. Finally, the data analysis presented seems incomplete. I wish to see a revision of the paper before being able to accept it for publication.

First of all, as the paper is mainly based on finding the source of errors associated with the Full Correlation Analysis applied to MF radar, I would have liked to see this method better explained. Although this method is explained in full detail in Briggs et al. (1984), this paper is quite difficult to find and it would rather be useful for a reader to have at least the basic principles of such a method reminded in the present paper. As the paper is not too long, I do not think it would be much of a problem to add a section about this method.

Second, one of the central figure of the paper is missing: that is Figure 9. As this figure is supposed to fully confirm that there is a strong correlation between axial ratio and both number of outliers and hourly variance and thus that the radar data quality are the cause of the large wind values, I would really like to see this figure before accepting this paper.

Third, I would like to see explained why the correlation analysis made with respect to solar insolation and geomagnetic activity are only performed with zonal winds. This is not explained anywhere and sometimes, it is not even clear if this is only zonal winds or combined zonal and meridional winds which are presented, especially in figure 10 where it is not stated neither in the captions nor in the associated text. If for example, meridional winds naturally show a smaller signal variance then it is worth stating it.

Finally, I would like to see better explanation for Figure 11. Indeed, as the AE index is a measure of the geomagnetic activity in the Northern hemisphere while the MF radars data analyzed in this paper are in the Southern Hemisphere, it will be good to better describe the seasonal correlation, in particular for which seasons correspond the maxima and the minima of the correlation coefficients and to explain physically these

C2

maxima and minima.

Other question: On Figure 7, I am really surprised that the solar elevation angle with respect to local time is so different between April and October whereas these two months are very close to equinoxes. Are the authors sure of their calculation?

Few typos: Line 99: “for Rothera, the diurnal tide maximizes in Winter whilst the semi-diurnal peaks in winter”: I wonder if there is not a problem in the seasons listed in this sentence, is it really always winter? Line 134: “The data in fig. 3. . .” should be replaced by “The data in fig. 4. . .”

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss.,
<https://doi.org/10.5194/gi-2019-34>, 2019.