

Interactive comment on “Dynamics of the Antarctic and Arctic mesosphere and lower thermosphere – Part 1: Mean winds” by D. J. Sandford et al.

Anonymous Referee #3

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This study compares the horizontal wind field observed in the Arctic and Antarctic at conjugate latitudes using near-identical Meteor radar. The analysis discussed provides a good deal of useful information to the community given the limited number of this type of study. The use of identical instruments and the comparison with the URAP and HWM-07 models are also potentially very useful. However, in my opinion this work could be significantly improved by incorporating a more rigorous statistical analysis. In particular, the extended sampling at both sites means that climatological means and measures of variance have already been calculated and thus it would be simple to apply the student's t-test to quantify the statistical significance of the observed differences detailed in the text and add some rigour to the analysis. I think this type of extra anal-

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ysis would make this work much more valuable to the community and thus I strongly suggest this simple extension to the analysis should be completed before this paper is accepted (though I consider this a minor revision). I also indicate a number of small points that the authors may wish to consider in addition to this main point.

Minor Points:

Page 17529 Line 14: Replace 'deposited' with 'deposit'

Page 17529 Line 16: Remove 'entire' it is unnecessary.

Page 17529 Line 25: Replace 'well-know' with 'well-known'

Page 17530 Line 22: The relatively equal number of references in this section appears to contradict this sentence?

Page 17531 Line 7: You should probably also reference Wu and Jiang (2002) and Baumgaertner and McDonald (2007) at this point.

Page 17531 Line 7: You have mentioned the climatological differences in the stationary planetary wave field which may also effect the differences observed in the mesosphere. Was this omission deliberate?

Page 17533 Line 15: What is the number of meteor measurements used as a minimum?

Section 2: Would removing long-period planetary wave motions have any impact on the monthly mean winds calculated?

Section 3.2: This section would be improved by identifying regions where the Arctic and Antarctic measurements are statistically different using student's t-test or similar methodologies. I believe this is an opportunity to markedly improve the paper and I believe this should be completed before this paper is accepted for publication.

Section 4: You identify some studies which have shown differences between MF radar

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and Meteor radar winds. However, there are studies which suggest that the data from these instruments do not show statistically significant discrepancies, perhaps these should be referenced also for balance. (e.g. Hall et al., 2005). You also use the word 'significant' quite often in this section and I think you should only use this word (which implies a certain set of statistical analysis) if you have completed that analysis!

Page 17550 Line 2: Replace '(no shown)' with '(not shown)'

Section 5 Page 17550 Line 16: Can you expand on '...behaviour of Antarctic and Arctic stratospheric vortex, in particular sudden stratospheric warmings.' this in the discussion section. In particular, are you talking about transmission effects on the gravity wave field observed in the mesosphere or are you talking about the difference in the stationary planetary wave field? Please expand.

References

Baumgaertner, A. J. G., and A. J. McDonald (2007), A gravity wave climatology for Antarctica compiled from Challenging Minisatellite Payload/Global Positioning System (CHAMP/GPS) radio occultations, *J. Geophys. Res.*, 112, D05103, doi:10.1029/2006JD007504.

Hall, C. M., T. Aso, M. Tsutsumi, S. Nozawa, A. H. Manson, and C. E. Meek (2005), A comparison of mesosphere and lower thermosphere neutral winds as determined by meteor and medium-frequency radar at 70°N, *Radio Sci.*, 40, RS4001, doi:10.1029/2004RS003102.

Wu, D. L., and J. H. Jiang (2002), MLS observations of atmospheric gravity waves over Antarctica, *J. Geophys. Res.*, 107(D24), 4773, doi:10.1029/2002JD002390.

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