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Atmospheric Chemistry and Physics Discussions

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 #1

Received and published: 13 August 2010

General Comments: This manuscript makes a useful and important comparison between the mean winds of the Arctic and Antarctic MLT regions using identical measurement techniques (meteor wind radars) and with considerable overlap of the intervals over which data where gathered. It thus provides an excellent benchmark for comparisons of the dynamics of the two hemispheres. Their description of the similarities and differences is thorough and their observations are compared to two empirical models. A discussion of possible causes of the hemispheric differences is also included. The value of the data, comparison and discussion make the manuscript a worthwhile contribution to ACP after due consideration of the comments below.

Specific Comments: The manuscript would benefit from clarification of the following issues. On line 14 of p17533 it is argued, on the basis of Figure 2, that the low diurnal modulation of the meteor count rate means that there are sufficient meteors at low count times of the day to calculate mesospheric winds. This statement ignores the height and seasonal variation of the meteor counts, both of which could decrease the meteor count rate to unusable levels. It is also inconsistent with the comment made on line 2 of p17534. This line of reasoning needs to be explained with more clarity.

Line 26 on p17535: July is not summer in the southern hemisphere. Please re-word this section as appropriate.

Line 3 of p17540 onwards: The URAP model contains winds from HRDI (on the UARS satellite) whose high latitude limit is close to the 68 degrees used here. Some reference to the implications of this should be noted in this comparison. It is also important to note that HRDI (and so URAP) provides winds that are the zonal mean wind with a component of the migrating tides aliased onto them (see the Swinbank and Ortland 2003 reference included in the manuscript bibliography). The tides at the heights sensed by the meteor radar will have grown to an amplitude that can be large enough to influence the difference between URAP and observations. This should be noted and discussed in the manuscript.

Line 11 of p17545: There was no MF radar at Molodezhnaya (to this reviewer's knowledge).

Line 25 of p17548 onwards: The variability of summertime mesosphere over Antarctica is now known to be related to the variability of the winter stratosphere in the other hemisphere. (See the work of Becker, E. and Fritts, D. C.,[Enhanced gravity-wave activity and interhemispheric coupling during the MACWAVE/MIDAS northern summer program 2002, Ann Geophys, 24, 1175-1188, 2006.], Karlsson, B, McLandress, M. and Shepherd, T. G., [Inter-hemispheric mesospheric coupling in a comprehensive middle atmosphere model, J. Atmos, Sol-Terr Phys., 71, 518-530, 2009.] and references

therein.) Some discussion of this work would enhance this manuscript.

Line 19 of p17549 onwards: Here aspects of decadal trends are discussed. Reference to the paper my Merzlyakov et al. 2009 (in the manuscript bibliography) and their findings of changes in the trends of the summer and winter wind fields over Antarctica since 1970 would enhance this discussion.

Fig 1 caption – Are these numbers of detections per day (please indicate)

Technical comments:

17529-14 deposited -> deposit

17529-25 know->known

17530-11 speed->speeds

17530-16 radar->radars

17533-11 delete is

17533-22 later->late

17534-22 figure->figures

17539-4 delete are

17544-14 insert of after most

17545-12 MacMurdo -> McMurdo (I think)

17545-25 records->record

17547-27 delete 'with the'

17548-4 determine->determining

17550-8 the there -> there

Fig 3 caption: the max count line is white, not black

Figures 9-13 (and possibly the others) the colours on the colour bar do not match those used between the contour lines on the plots. (E.g. Fig 12 colour bar has no yellow.)

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 17527, 2010.