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# ***Interactive comment on “The two-day wave in the Antarctic and Arctic mesosphere and lower thermosphere” by V. M. Tunbridge and N. J. Mitchell***

**Anonymous Referee #3**

Received and published: 16 June 2009

Comments on AG/2005169 entitled by “The two-day wave in the Antarctic and Arctic mesosphere and lower thermosphere” by V. M. Tunbridge and N. J. Mitchell

The authors utilized meteor radar wind observations at Rothera and Esrange to study the characteristics, in particular differences between the two sites (i.e. in the northern and southern hemisphere), of the two day wave in the mesosphere and lower thermosphere at high latitudes.

In this current paper, the authors found significant similarities and differences between the two sites, and these findings are important for understanding the two day wave at high latitudes. I believe the paper is of a suitable quality for publication, but I have some

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concerns described below. I suggest that changes should be made to the text before this paper is published.

Major comments: (1) I wonder if all the findings shown in section 3 (Results) are newly founded by this study or already pointed out by previous studies. If some results have been already pointed out by the previous studies, the authors should distinguish them when they present.

Minor comments:

Line 22-23, page 10275: "For each month of data a variance value was calculated from the bandpassed horizontal winds in each height gate."

It would be necessary the author should show how to calculate the variance in mode detail.

Line 4 and line 11-12, page 10276 In Figure 1, and 2, are there any reasons the authors present data obtained different years ? To compare results from the 2 sites, the same data should be presented.

Line 19-20, page 10276 "The figures show that there is a significant difference in the frequency of the wave between the 2 hemispheres."

Since Figure2 shows data for different time intervals, I am not sure if this statement is correct. The authors should show data for the same interval in Figure 2.

Line 20-21, page 10277: The authors say "the period of the wave is slightly different..." From the figures, it is impossible to see such features.

Line 2, page 10278: "in contrast to the summertime wave the period of the wave appears to be about the same, 2.2 days, in both the Antarctic and Arctic". It is difficult to see the period of the wave from Figure 5a and 5b.

Line 8-10, page 10278: "To investigate this further, monthly values of variance were calculated and used as a proxy for wave activity."

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Similar statements are found in section 2. It would not be necessary to repeat. Furthermore, it would be a great help if the authors present how to calculate the variance in more detail in the manuscript. Also, to compare the results with other studies published, it would be nice to show an amplitude value (m/s) corresponding to the peak variances (160 m<sup>2</sup>/s<sup>2</sup>) for example.

Line 14, page 10278: Figure 6. I do not think blank (year 1999-20004) is necessary.

Line 20, page 10281: "the Antarctic wave activity is shorter lived than that in the Arctic." I agree this is right for the meridional component, but I am not sure about the zonal component from Figure 10b.

Line 4-5, page 10282: "The wave reaches significant variances (say, above 20 m<sup>2</sup>/2) in May-August". I am not sure if the variance value with 20 m<sup>2</sup>/s<sup>2</sup> can be said "significant"? Is there a definition?

Line 7, page 10285: "the latter two studies" is not clear.

Line 5-6, p.10286 "We interpret the wintertime wave as the polar eastward 2 wave reported in Sect. 1." Do the authors state all the winter q2dw are E2 ? How sure is this?

Typing errors: Line 2, page 10280 "Contours": "C" should be "c". Line 22, page 10280 "meridional l": "l" should be omitted. Line 25, p.10285 "," between Rothera and (68S,68W) should be omitted.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 10271, 2009.

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