

## ***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 #2**

Received and published: 30 April 2009

### General Comments

Summary: This manuscript reports on analysis of radar observations over Antarctica and the Arctic with respect to the 2day wave over a couple of years. Presentation of this new dataset and analysis deserves to be published, but only after revising it carefully. My two main concerns are the following: First, in general I think that the presentation of the results are not presented in a very orderly fashion and need some going-through again. Figures show analysis of different aspects of the wave for different periods without justifying well why those periods are chosen. For example, I would start with figure 7 and 8 to show the complete dataset first and then start to discuss both

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hemispheres and summer and winter in more detail. Figure 1 and 2 are for different periods, but show basically the same, etc, etc...

Second, you state in the introduction that a key objective is to analysis the waves interaction with the general circulation. While there is some discussion on this aspect, this could be much improved by doing a simple analysis to see whether the inter-annual variability of the 2day wave is related to inter-annual variability of the mean flow. You could look at figure 11 like figures for the different years. Note: I have written these comments from the first manuscript I received, and just realised that in a new version of paper this was already done!...still needs more discussion on inter-annual variability of the background winds shown in new figures 6 and 7).

### Specific Comments and Typos or small language corrections

#### Abstract

\*Line 2: suggested change: Here we report studies... change to: Here we report on a comparative study made....

\*Line 22: The observed differences...is probably.... change to ARE probably due to...

#### 1 Introduction

\*Specify in the first paragraph that the analysis will be on the wind field, since the wave is also observed in the temperature field.

\*Lines 77-78:"... have also revealed existence of strong 2-day wave activity around winter solstice." Please specify where? polar regions? To understand line 80: "This latter wave activity is not present at....""

#### 2) Data and Analysis

\*Line 99, missing word: ...since February 2005 and Esrange radar SINCE October....

\*Last paragraph, line 110: say explicitly for which periods you bandpassed. More gen-

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erally, you explain in the paragraph variances will be used in the analysis, but actually only a small part of the analysis is done with this quantities. The last two phrases are repetitive. Change paragraph.

### Section 3.1

\*Line 127: "...presents a periodogram of summertime...change to:...presents a periodogram of Southern Hemisphere summertime..."

\*Line 128: "...over Rothera for the three month interval..." change to: "...over Rothera for the two month interval..."

\*Paragraph of lines 132-134: mixing summer and winter, these statements need more explanation.

\*Line 151: "Figure 4a, b presents two examples..." suggestions: "Figure 4a, b presents two examples...for periods of strong wave activity in fig 3a,b."

\*Line 161: "...in the Arctic the period is about 2.2 days..." These are different value as given in lines 133-134!

\*Line 164: "Figure 5a,b presents similar..." suggestion: Figure 5a,b presents results of the same analysis for other periods representative of winter...

\*Line 169: used twice the word AGAIN...change 1.

\*Line 178: "For Rothera...." suggestion: In general for Rothera...

\*Line 196: "(not shown for...)" just write: (not shown)

### Section 3.2

\*Line: 210: "...events described above" change to: "...events described in previous section..."

\*Paragraph describing figure 7 is bit "obvious" ...figure emphasizes the inter-annual variability and representativeness of previous analyses.

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\*I would change the first phrase to something like: From results presented in the previous section, it is apparent that there is a seasonal cycle...

\*Line 234: "Figure9a presents two examples of this analysis" change to: "Figure9a presents the result of this analysis for the 2day waves over Rothera"

\*Summary of the summer and winter 2day waves is good, but please include a summary of the periods of the waves.

\*Figure 11: Could you comment on the positive variance in the zonal component around Sep/Oct?

### 4 Discussion

\*Line 325: E2 is not defined.

\*Line 328 suggestion: change "consider" to "discuss".

\*Line 341: Suggestion "...2-day wave activity is rather..." include:

\*"...2-day wave activity, although of larger amplitude..."

\*Discuss your findings about the periods of the waves.

\*Line 345: Include a newer reference: M. Rojas and W. Norton, 2007: Amplification of the 2-day wave from mutual interaction of global Rossby-gravity and local modes in the summer mesosphere. JGR Vol. 112, D12114, doi:10.1029/2006JD008084

\*Last paragraph (lines 383-391), I don't understand this paragraph...are you talking about both 2day waves, only the winter 2day wave...what is the conclusion of the statement made?

### 5 Conclusions

\*Line 397: take out technique (its repeated in the next line)

\*I don't understand the conclusions about the wintertime 2day wave. Please clarify

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considering my comment about clarifying the discussion on the wintertime (last paragraph of section 4)

#### Technical Corrections

\*Figures: change time axis labelling from days to actual month would make reading the figures much easier.

\*Figure2: If this were done for the same period of figure 1, would it present any significant information?

\*Figure 4 and 5: Why show only part of 2007?

\*Figure7: take empty panels out.

\*Please be consistent with units used.... wave periods are given sometimes in hours sometimes in days.

Please also note the Supplement to this comment.

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