

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

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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.

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