Atmos. Chem. Phys. Discuss., 9, C9776–C9778, 2010
www.atmos-chem-phys-discuss.net/9/C9776/2010/
© Author(s) 2010. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The 16-day wave in the Arctic and Antarctic mesosphere and lower thermosphere" *by* K. A. Day and N. J. Mitchell

Anonymous Referee #2

Received and published: 17 January 2010

The topic to investigate the 16 day wave is not new. However, the comparison of results obtained with nearly identical radars at polar latitudes of both hemispheres and derived for 10 years (Esrange) or 5 years (Rothera) is a novel scientific contribution. In general, this manuscript follows in its methods previous publications by the same group about the two day wave (Tunbridge, Mitchell, ACP,2009) and on the 5 day wave by Day and Mitchell (JGR, 2009). Additionally, the authors included here variations of temperatures to compare them with wind variations at nearly the same periods. The paper is well written and organized.

A small critical remark: The authors should explain that the observed periodic wind variations are in the first order oscillations of winds which can be related to and interpreted as planetary waves.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

To improve the paper for the final publication in ACP, the authors should consider the following remarks:

1) In the introduction the authors clearly described possible mechanisms allowing the propagation of 16 day waves up the MLT region. However, from the reviewer point, there are assumptions but no real answer to explain the mechanisms for the resulting variations in the MLT region at polar latitudes presented in this paper. Some additional hints for future work would be helpful.

2) The relationship between temperature and wind perturbations which seem to be in phase for the majority of the detected bursts with T'=0.27u' is very interesting. Is there any theoretical support for this experimental result?

3) A simple question: The temperature estimated from meteor radars is representative for the centroid altitude of the meteors. If the wind perturbation creates density fluctuations then these can lead also to altitude variations. Are there any ways to exclude quantitatively these variations as possible reasons for the used temperature variations?

Minor comments

1) Abstract: the logical order can be improved by exchanging the 4th and 5th sentence. Please compare the summarizing results given in the abstract with those given in the conclusions, there are some inaccuracies: e.g., concerning the strength of the wave variances during winter. The slightly greater amplitudes in the zonal components are obviously at Rothera but not at Kiruna, comparing Figs 5 and 6.

2) The knowledge of the properties of the used Butterworth filter (including a reference) would be helpful. Another way consists in the direct use of the wavelets for the selected bandwidths to reproduce the desired variations.

3) page 25216 line 13: In contrast to the situation at mid-latitudes.

4) Page 25226 line 4: please change" the MLT" into " the polar MLT" corresponding to the introduction (page 25216, line 13-14.

ACPD

9, C9776–C9778, 2010

CC BY

5) Page 25230 line 9 delete “,s”

6) Page 25230 line 15 and line 18 "suggests"

7) Page 25241: Please check the given altitudes in the caption of Figure 7: Esrange at ∼85 km and Rothera at 93 km, in comparison to Figs. 5 and 6, showing at these altitudes the maxima.

8) page 25242: versus instead of verses

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 25213, 2009.