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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simultaneous lidar observations of temperatures and waves in the polar middle atmosphere on both sides of the Scandinavian mountains: a case study on 19/20 January 2003" *by* U. Blum et al.

U. Blum et al.

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Answers to comments of reviewer #1

First, we thank the reviewer #1 for his precise and useful comments. The revised manuscript will incorporate his comments.

1. *The reviewer asked why the particular method of spectral analysis was chosen.* As the reviewer points out, the power spectrum results in power density amplitudes with units of K*m. The chosen scaling converts these to wave amplitudes in units of K. The choice is arbitrary, but it provides a more intuitive picture of

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the wave-strength. However, since it is not used explicitly in the paper, we have removed this somewhat confusing technical detail from the revised manuscript.

2. *The reviewer argues that the GWPED is not constant with altitude, but constant along a ray path.*
   In case of a horizontal phase speed, the waves are ascending vertically and our assumption is met. However, as we do not observe a single wave but a superposition of different waves, this statement does not strictly hold. Therefore we have rephrased the statement that 'the measurements show unambiguously that the observed waves deposit energy with increasing altitude in the 30 - 50 km region' to 'the measurements indicate that ...'.

3. *The reviewer asked about the meaning of the propagation direction in case of a horizontal phase speed of zero.*
   An observed horizontal phase speed of zero does not prevent the wave from propagation. The observed phase speed is the sum of intrinsic phase speed and background horizontal wind. An observed phase speed of zero implies that the intrinsic phase speed of the wave is equal and opposite to the horizontal wind speed.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 969, 2004.

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