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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Rocket measurements of positive ions during polar mesosphere winter echo conditions" *by* A. Brattli et al.

A. Brattli et al.

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We have no objections to the actual numbers for wavelength and wavenumbers listed in paragraph 2 of the referee's report. However, the referee uses the phrase "scale length" differently than we did; as we wrote in our previous reply, we have used the expressions "wavelength" and "scale length" interchangeably, both meaning $2\pi/k$, and in the figures we even used "scale size" for the same quantity.

To avoid unnecessary confusion, we have now changed "scale length" and "scale size" (where these terms can be confused, including figure labels) to "wavelength" , $\lambda \equiv 2\pi/k$, consistent with the referee's nomenclature.

We of course also agree with the referee that the lengths to be used in formulas are not arbitrary. Particularly in our equation 15, where the right-hand side is proportional

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to l_N^{-4}, it makes a huge difference whether you use $l_N = 1/k$ or $l_N = 2\pi/k$. However, from Lübken et al. (1993), from where this formula has been obtained, there is no room for choice: As written on the very last line of p. 20370 of that paper, "...the breakpoint scale (also called the inner scale) $l_0^H \equiv (2\pi)/k_0$ is...". Subsequently it is this l_0^H which is used in their equation 4 (from which our equation 15 has been obtained). Had we instead used the wavenumber k_0, delineating the transition from the inertial to the viscous subrange, our equation 15 would read

$$\epsilon > \nu^3 \left(\frac{9.9k_0}{2\pi}\right)^4 \approx 6.2\nu^3 k_0^4,$$

and our lower estimate for ϵ would of course remain unchanged.

What we show in this paper is that for the ion density, we find turbulent ($k^{-5/3}$) spectra in the altitude regions where PMWE were detected, and nonturbulent spectra outside. Our instruments did *not* measure the electron density directly, only the positive ion density. In addition, electronics noise prevented us from seeing details at the Bragg scale/wavelength. Our rocket measurements therefore provide no information about electron density fluctuations at the Bragg scale. The caption of Table 2 makes it clear that the last two lines are for hypothetical inner scales, not for measured inner scales.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 7093, 2006.

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6, S3947–S3948, 2006