

## ***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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*“First, the time and location of the ALWIN radar measurements relative to the rockets should be stated in the paper.”*

The distance between the ALWIN radar measurements and the rockets were  $\approx 7.8$  km ( $\approx 25$  km) at 56 km altitude on upleg (downleg) for RWMM-01, and  $\approx 5.8$  km ( $\approx 22$  km) for RWMM-02 (now added to Section 3). Integration times for the two radar profiles were  $\approx 18.5$  minutes, centered around the launch times of the rockets (we now give this information in the caption of Figure 2).

*“Also, no explicit criteria as to how to classify radar echoes as PMWE are mentioned. In the case of the RWMM-02 flight, the identification of PMWE in the radar signal would appear to be rather subjective below 65 km.”*

The PMWE measured by the ALWIN radar at the time of the launch of the first payload consisted of two layers ( $\approx 55$ – $63$  km and  $\approx 70$ – $75$  km). The lowest layer subsequently split up into two layers, and eventually died out. By the time the second payload was launched, the remains of the lowest layer were just above the detection threshold of the radar. Thus, this layer was still there, but only barely visible. This is mentioned in the manuscript, but we have now rephrased it slightly, and moved the paragraph to a more logical place. In addition, we have modified the left panel of Figure 2 to show the radar reflectivity instead of the SNR (with numerical values on the x-axis), and the two radar profiles are now overlapping, making the lower PMWE layer easier to see in the second profile.

The mean characteristics of PMWE are discussed in Zeller et al. (2006), and references to this paper are in Section 1.

*“Finally, it is not apparent from Figure 3 that the spectra above 82 km on RWMM-02 cut off above the 10 m scales, particularly on the upleg. [...] Thus, it would be very useful if the spectra from the 82–85 km region on the upleg could be plotted as a separate panel in Figure 5 to clearly demonstrate that they do not extend into the 10 m scales.”*

We have added the extra panel to Figure 5, with spectra from 83.4–83.5 km. This shows fluctuations with peak energy density at  $k \approx 0.3 \text{ m}^{-1}$ , and from there being heavily damped, following a  $\sim k^{-7}$  curve towards higher wavenumbers. A short discussion is also added to Section 4.

*“On page 7097, the authors mention that the wavelet technique “overcomes many of the time-frequency localization problems” of the Fourier transform method. I would suggest that if the authors briefly detail these problems, it would be beneficial to the community involved in such measurements.”*

We have added a brief discussion to Section 2 on how the Wavelet transform improves on time-frequency localization.

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*“In section three, the authors give a brief description of the Positive Ion Probe (PIP). Does there exist a more detailed instrument description to which the reader might be referred?”*

Not for the exact probe configuration used on these flights, but the principles are described in Blix et al., JGR, 95, 5533 (1990) and in Sagalyn et al., JGR, 68(1), 199 (1963). These references have been added to the paragraph in question.

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

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