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Atmospheric Measurement Techniques Discussions

Interactive comment on "Multi-scale Measurements of Mesospheric Aerosols and Electrons During the MAXIDUSTY Campaign" *by* Tarjei Antonsen et al.

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The leftmost panel of Figure 13 displays the global wavelet spectrum power density; it is the wavelet transform multiplied with its complex conjugate and thus displays a power spectral density. We are uncertain about whether or not the global wavelet spectrum can reveal more useful information, as the PSD is the quantity which is more easily relatable to PMSE.

To look at the connection between wavelet spectrum and radar backscatter we use the PSD at wavelengths close to the radar wavelength (+/- 1 wavenumber bin). The result, as shown in Figure 17, shows that edge effects are poorly represented in the PSD, and

that the PSD curves show more structure (due to integration height of PMSE?).

As was pointed out earlier by the referee, it might be very interesting to look at snippets of interesting height regions of the cloud system and discuss the wave number dependency. This is a good point which we intend to include in a revised manuscript. As an example, see the appended figure. This is a PSD (DUSTY data) from a $\sim$400 m slice during MXD-1B. Even though it seems 'all' spectral strength has dissipated at radar wavelengths, the PMSE is still very strong. We note that the raw current is used here, and the true PSD values are several orders of magnitude higher. For MXD-1B, the PMSE SNR is particularly strong in the entire region, and we can find many examples where the spectral strength is low, even though the SNR is strong. For the revised manuscript, we shall carefully consider if a discussion connected to these 'issues' can improve the paper.

As a last point, we need to address the spectral properties of the electrons. As it turns out, the electrons and charged aerosols are well coupled down to the smallest scales. An example is the comparison in Figure 11. Thus, in a spectral analysis, the results will be very similar. Due to this we have omitted an additional wavelet analysis of the electrons here. Similar findings have been reported on earlier. E.g. Rapp, Lübken and Blix ACP, (3)1399-1407 (2003) show in their Figure 7 comparisons of electron and aerosol PSD in short height regions. The spectral slopes are virtually identical over the entire range. Moreover, one must use assumptions to acquire the electron density from the mNLP-probes (and the validity of the theory is not always easy to test for at these heights) while the dust charge number density is correlated one-to-one to the recorded currents.

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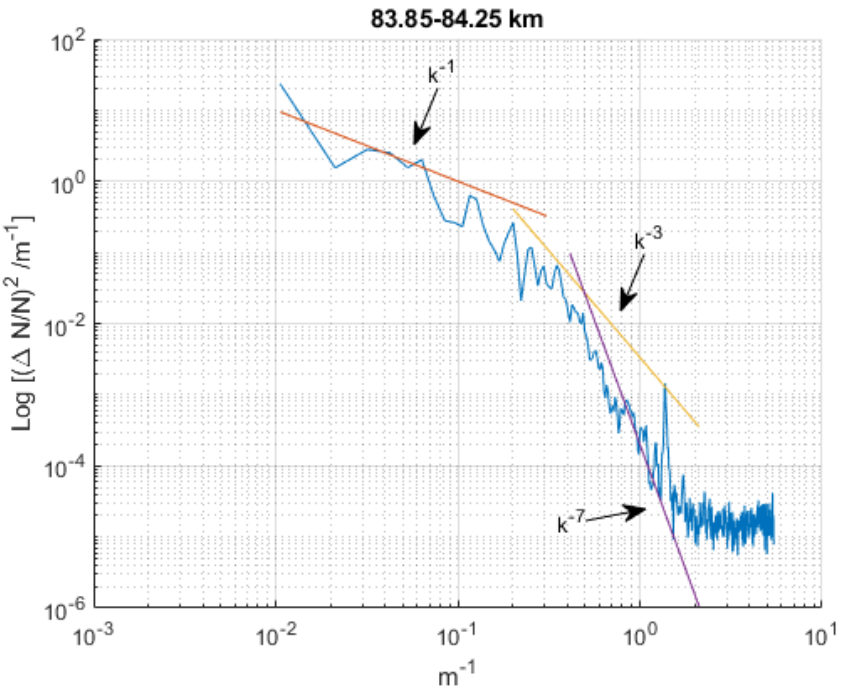
83.85-84.25 km
k-1
k-3
k-7
Log [(Δ N/N)2 /m-1]
m-1
10-3
10-2
10-1
100
101
10-6
10-4
10-2
100
102

Fig. 1.