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Comment

Interactive comment on “Latitudinal aerosol size distribution variation in the Eastern Atlantic Ocean measured aboard the FS-Polarstern” by P. I. Williams et al.

Anonymous Referee #2

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General:

In this manuscript, latitudinal aerosol number size distribution measurements covering the size range 0.03-25 μm of particle diameter over East Atlantic Ocean is presented. Despite the scarcity of the data, I think that the data set, together with the analysis made using newly developed tools, is original enough to be published in Atmospheric Chemistry and Physics. I have a few comments that require some action before the paper can be accepted for publication.

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The authors do not mention whether they had any control device to eliminate pollution from the ship itself, or whether the periods affected by ship-derived pollution were identified somehow in their data/error analysis. This is important because ship emissions are known to contaminated particle number size distribution data in marine environments.

The authors spend some time in discussion the modal structure of the measured size distributions. Here I would like to see some more comparison with other similar measurements. In addition to the work by O'Dowd et al. (1997), marine aerosol number size distributions have been discussed comprehensively in the studies by Covert et al. (1996, JGR 101, 6919-6930), Heintzenberg et al. (2000, Tellus 52B, 1104-1122) and (2004, Tellus 56B, 357-367). Furthermore, in the work by Koponen et al. (2002, JGR 107(D24), doi:10.1029/2002JD002533) the modal structure of the submicron aerosol was measured at approximately the same route and same time of the year as in this manuscript.

Calculation of the trace gas loss rates (section 3.1) is interesting, especially since the authors have practically measured the whole particle size range relevant for this loss. There are a few points that might deserve some additional discussion. First, it is not mentioned which value of the accommodation coefficient has been assumed in Figure 9. This value can have a large influence on the “size distribution” of the loss rate depicted in Figure 9. Second, the authors should mention that the distribution given by Figure 9 might be affected by the fact the either the accommodation coefficient or the heterogeneous reaction rate might depend on particle type (and size), i.e. they could be different for supermicron and less acidic sea-salt particles than for submicron, sulfur-containing and more acidic particles. Third, the loss rate is interesting not only because of heterogeneous marine chemistry but also because of other processes such as new particle formation. As we know, new particles formation in most marine environments seem to be rare, possible because of moderate sources of aerosol precursors combined with relatively large condensation sink caused by sea-salt particles.

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The authors could comment on this issue as well in the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 12865, 2006.

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