

Interactive comment on “CCN predictions using simplified assumptions of organic aerosol composition and mixing state: a synthesis from six different locations” by B. Ervens et al.

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Received and published: 23 February 2010

We thank Anne Jefferson for her thoughtful comments on possible instrumental uncertainties in the CCN retrieval and her suggestion of an alternative way of determining the age of air masses.

Comment: “I wonder if you’d get better correlations with the measured CCN at the polluted sites, close to source regions, if you eliminated data with very high aerosol loading or number concentration or scaled the data wrt CN number concentration. Does your correlation drop off with CN conc. The DMT CCN manual (page 77) notes that the measured CCN drops off at high aerosol loading (CN>6000/cc) at the low %SS

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(<0.3%). This drop in CCN is likely due to not enough water vapor in the instrument or kinetic limitations, i.e. too short of a residence time.”

Response: In our analysis we have not considered the limitations of the CCN instruments. For all data sets we have used CCN measurements used in this study at a supersaturation $S \sim 0.3\%$ (Table 1). The figure in the Manual of the ‘CCN count rate vs Supersaturation’ shows that at this supersaturation, the instrument counts > 90% of all particles even at very high CCN number concentrations. At the most polluted locations (RVS, MEX) the average particle number concentration was $\sim 15000 \text{ cm}^{-3}$ with maximum values as high as $30,000 \text{ cm}^{-3}$. Analysis of the RVS data set in our previous study has shown that even at low aerosol loading, only 20% of these particles were activated into CCN at $S \sim 0.3\%$ (cf Cubison et al., 2008, Fig. 3). Thus, the threshold of NCCN $\sim 6000 \text{ cm}^{-3}$ will be never significantly exceeded and we safely assume that the large overestimate of particles at polluted locations is not due to undercounting of CCN by the instrument. We add these considerations in Section 4.1 in the context of our discussion of possible reasons for overpredicting CCN number concentrations at locations close to sources.

Comment: “Did you measure CO at any of the sites? The ratio of BC/CO can also a good indicator”

Response: We add the fact that the ratio of BC and CO can be also used as a measure of air masses to Section 4.2 in the revised manuscript. Unfortunately, these measurements were not consistently available for all data sets. Since the age of an air mass based on any chemical tracer gives only a relative age, we decided to use ‘distance from sources’ as a more consistent measure throughout all data sets.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 21237, 2009.

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