**Atmospheric
Chemistry
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Discussions**

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Interactive comment on "Effects of aerosol organics on cloud condensation nucleus (CCN) concentration and first indirect aerosol effect" *by* J. Wang et al.

J. Wang et al.

Received and published: 11 September 2008

We thank Rose et al. for their constructive comments. We have included the recent study by Rose et al (2008), which was published just before the submission of our original manuscript.

As rightly pointed out by Rose et al, the water vapor supersaturation in a continuous-flow CCN counter (DMT-CCNC) depends on the operating conditions, including the pressure (P), temperature (T1), flow rate (Q), and the temperature difference between the top and bottom of the growth column (DT). The supersaturation calculated using flow models can deviate substantially from the measurement, and careful calibration with reference aerosol is necessary. Prior to the Marine Stratus/Stratocumulus Exper-

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iment (MASE), the DMT CCNC was calibrated using ammonium sulfate at P=920hPa, T1=30 C, Q=0.65L/min, and DT=4 C. Based on this calibration, the supersaturation was derived as 0.22% from Kohler theory using a constant van't Hoff factor of 2.5 for ammonium sulfate. During MASE, the temperature difference (DT) and flow rate (Q) were maintained the same as during the calibration. Roberts and Nenes (2007) showed that the supersaturation inside DMT-CCNC is proportional to the pressure, which is also in agreement with the data presented in Fig8b of Rose et al. (2008). In our analysis of MASE CCN data, the variation of supersaturation due to the pressure change during flight was corrected using the following equation:

S=0.22%*(P/920hpa)

where S and P are the supersaturation and pressure inside the DMT-CCNC, respectively. The effect of temperature (T1) on supersaturation is significantly smaller than that of pressure for the measurements during MASE. Unlike pressure, the effect of T1 on supersaturation is nonlinear. In the absence of calibration data over the temperature range, the correction of this secondary effect is not straight forward. During MASE, T1 varied mostly from 31 to 36 C, i.e. 1 to 6 C above the temperature during the calibration. In its Fig. 9a, Rose et al. (2008) showed the decrease of supersaturation due to increase of T1 at 1020 hPa. Assuming the relationship is independent of pressure, at DT =4 C, an increase of T1 by 1 to 6 C leads to a decrease of supersaturation by ˜1.6% to ˜9.6% (relative). This corresponds to a decrease of supersaturation from 0.22% to 0.2%-0.216%. As pointed out by Rose et al. (2008) (Fig. 8a), such variation is within the uncertainty of calibration. Therefore, the small effect of T1 on supersaturation is neglected in our analysis. After correction for pressure change, the supersaturation ranged from 0.17-0.23% during MASE.

We thank Rose et al. for raising these important points. The above discussion and the recent study by Rose et al. (2008) are now included in the revision of our manuscript.

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Rose, D., Gunthe, S. S., Mikhailov, E., Frank, G. P., Dusek, U., Andreae, M. O., and Poschl, U.: Calibration and measurement uncertainties of a continuous-flow cloud condensation nuclei counter (DMT-CCNC): CCN activation of ammonium sulfate and sodium chloride aerosol particles in theory and experiment, Atmospheric Chemistry And Physics, 8, 1153-1179, 2008.

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