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Interactive comment on “Hygroscopicity of nanoparticles produced from homogeneous nucleation in the CLOUD experiments” by J. Kim et al.

J. Kim et al.

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Received and published: 11 November 2015

We thank the referee for valuable comments that we have used to improve our manuscript. We have considered the comments and have modified the manuscript accordingly. Our detailed responses to the referee’s comments are below.

Referee’s comment: Page 19814, line 11: “the observed increases in k values” – do the authors mean “decreases”?

Authors’ response: Yes, you are right. It is my mistake. Our data showed that κ values decreased with increasing particle size. Text was corrected accordingly.

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Referee's comment: Page 19815, line 3: Can the authors also confirm that this evaporation does not account for the difference in acidity between particle sizes?

Authors' response: In order to estimate the impact of evaporation of DMA in the sampling tube on the acidity of particles with different size, the thermodynamic condensation model simulations were conducted using the MABNAG (Ahlm et al., 2015). These simulations showed decreases in DMA to SA ratio of 15% and 17% for 10 nm and 20 nm particles, respectively. This suggests that evaporation of DMA can only explain a minor fraction of the discrepancies in acidity of particles regardless of particle sizes. As the relative change in DMA to SA ratio due to evaporation in sampling line was larger for larger particle size, this also suggests that the effect of evaporation would tend to weaken the size dependence of DMA to SA ratio, not strengthen it.

Referee's comment: Page 19815, line 24: "at a constant paste" – do you mean "rate"?

Authors' response: Yes, you are right. It is my mistake. Text was corrected accordingly.

Referee's comment: Page 19816, line 10: Have the authors done any statistical significance testing to confirm this?

Authors' response: No statistical testing was done, as we didn't have repeated experiments for the different SA gas phase concentrations (only one experiment per SA gas phase concentration). The uncertainty range given for each SA concentration is the standard deviation between different scans (at least 15th scans of each diameter and experiment). The changes in κ between the three SA concentration cases are larger than the uncertainties of each value suggesting that there might be real difference in particle composition between these three cases, however the difference is small.

Referee's comment: Finally, I believe the figures would be much clearer if they were in colour, particularly figure 2 making the points more distinguishable.

Authors' response: We modified size and color of points in Figure 2.

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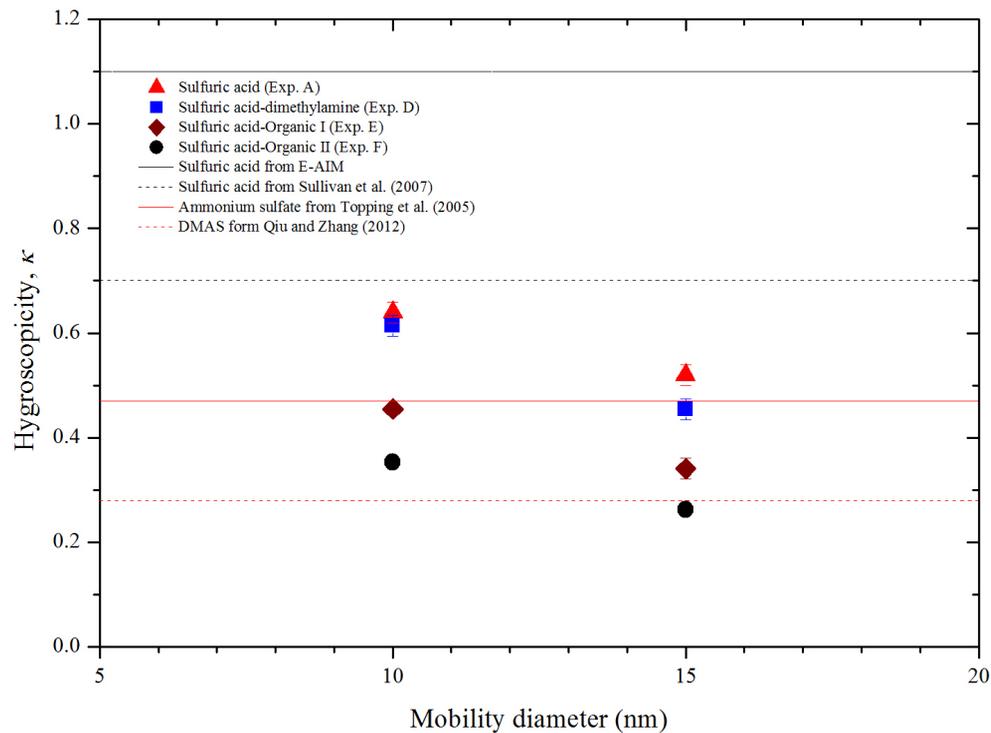
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Fig. 1. Comparison of hygroscopicity (κ) for 10 and 15 nm particles

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