**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "A coupled observation – modeling approach for studying activation kinetics from measurements of CCN activity" by T. Raatikainen et al.

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Response to Referee

We would like to thank Anonymous Referee #2 for the constructive comments. The comments (in italics) and our replies are given below.

As one key feature of the model is accounting for the impact of water vapor depletion on grown droplet size, I am a little surprised that this paper hasn't included more direct comparisons to measurements regarding this effect. The four calibrations were carried out at relatively low concentrations at which the depletion effect is very minor. It would be useful to examine the variation of simulated droplet size with increasing CCN con-

centration (i.e., as the effect of depletion changes from negligible to significant), and compare the simulated variation to measurements.

Water vapor depletion was examined in another paper (Lathem and Nenes: Water Vapor Depletion in the DMT Continuous-Flow CCN Chamber: Effects on Supersaturation and Droplet Growth, Aerosol Sci. Tech., 45, 604–615, 2011), which is referenced several times. The only limitation is that these experiments are limited to a single pressure (980 mbar) and flow rate (0.5 L/min). However, because we have unpublished experimental data for 450 mbar pressure, we have added a section about water vapor depletion effects. Calculations showed that the model is again able to predict depletion effects correctly at least for CCN concentrations up to 10000 cm^{-3}. Because different flow rates should not change model accuracy and these kind of calibration experiments are fairly time consuming, the other flow rates and extreme CCN concentrations are left for a possible future study.

Page 1834, line 25-28: Ambient aerosol composition has negligible impact on the refractive index of droplets, which is essentially the same as water (1.33).

This is true. We have removed the sentence from lines 25-28.

Eqn. (6): $\ln(S) 2$ should be $(\ln S) 2$ or $ln 2 S$.

This has been changed to $\ln 2(S)$.

Page 1840, line 23-25, please also present the comparison between simulated and measured droplet sizes for the ARCTAS calibration.

Results from ARCTAS calibrations have been added to Fig. 9 (now Fig. 10).