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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Cloud condensation nucleus activity comparison of dry- and wet-generated mineral dust aerosol: the significance of soluble material" *by* S. Garimella et al.

**Anonymous Referee #3**

Received and published: 30 December 2013

General comments:

In the manuscript "Cloud condensation nucleus activity comparison of dry and wet-generated mineral dust aerosol: The significance of soluble material" Garimella et al. investigate dry and wet generation methods for clays and test mineral dust and its influence on size distribution, CCN activity and elemental composition. Authors suggest that wet generation process is not appropriate for CCN activity studies. Additionally authors analyze results in the context of $\kappa$-Köhler and FHH adsorption activation theories

and conclude that $\kappa$-Köhler theory is appropriate for describing clay mineral nucleation activity. The paper is well-written and the methods used are described well. The manuscript is suited for publication in ACP. However, I have a few comments which the authors need to address before submitting the final version of the paper.

Specific comments:

Page 3, line 30. The sentence is either incomplete or "e.g." refers to citations. In a later case citations should be used without parentheses.

Page 4, lines 28-30. Arizona test dust is "an industrially derived sample" (as noted in the discussion part of this manuscript) rather than a "mineral dust sample . . . commonly observed in the atmosphere".

Page 5. Lines 5-7. Sullivan et al. (2010) should be cited here as well, since they discuss the same issues. They also discuss possible processes responsible for the observed discrepancy between CCN activity of dry- and wet-generated mineral dust aerosol so I recommend mentioning how results of this manuscript agree with results published by Sullivan et al. (2010).

Page 5, line 23. Replace <rho> by <rho>w to be consistent with equation (1).

Page 6, line 10-11. Since this manuscript involves discussion of wet vs dry particle generation methods and its effect on CCN activity it is worth to mention here if dry or wet generation method was used in Herich et al. (2009).

Page 7, line 7-8. Please make a comment either here or in introduction why 100-1000 nm is the desired size range.

Part 3.2.2 Particle Sizing and Counting. It is noted here that inlet DMA flow is 1 L/min while DMA sheath flow is 5 L/min. It is recommended to maintain DMA sheath to inlet flow ratio = 10:1 for the best size accuracy. Is there a specific reason that this ratio is 5:1 here? What is the impact of this setting on the size measurement?



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Page 9. Line 11. Remove “America”.

Page 12, line 8. The ratio between the mobility and the volume equivalent diameters according to DeCarlo et al. (2004) is

$D_m/(C_c(D_m)) = (D_v e\chi)/(C_c(D_v e))$

where Cc is a Cunningham slip correction factor.

Page 14, line 21. Insert space between “400” and “nm”.

Page 30, line 6. I recommend indicating how many measurements were performed to determine standard deviation of measured supersaturation.

References.

R.C. Sullivan, M.J.K. Moore, M.D. Petters, S.M. Kreidenweis, O. Qafoku, A. Laskin, G.C. Roberts, K.A. Prather. “Impact of particle generation method on the apparent hygroscopicity of insoluble mineral particles” Aerosol Science and Technology. 2010, 44, 830–846, 2010, doi: 10.1080/02786826.2010.497514.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31041, 2013.