Atmos. Chem. Phys. Discuss., 14, C3205–C3207, 2014
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A meta-analysis of particle water uptake reconciliation studies" *by* J. D. Whitehead et al.

Anonymous Referee #2

Received and published: 4 June 2014

Review of 'A meta-analysis of particle water uptake reconciliation studies' by Whitehead et al.

This is a nice short study describing reconciliation between measurements at subsaturated and supersaturated conditions over a wide range of locations, and gives quite good feeling of problems in the research area. The study highlights better agreement at larger super-saturations and provides some explanation for that, although, to my opinion, not sufficient. Despite some lack of discussion, this paper is nicely written and brings new insights into this quite complicated area; therefore, I would favour a publication in ACP after revisions listed below.

General comments: As mentioned above, my major problem is the lack of discussion

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as if the space limitation was an issue here, which is not the case, therefore, additional discussions should be included where appropriate:

P3, L258-263: The explanation of poorer reconciliation due to lower counting statistics at lower super-saturations is not very convincing, this should introduce a scatter, but not bias. To my opinion, a bias in estimation of the particular supersaturation is more likely to be the reason, which would be more pronounced at very low supersaturation (SS). Furthermore, the temperature stabilization in CCNC could be problematic at these SS. I understand that particular SS's were calibrated for each campaign instead of using standard DMT SS (it should be mentioned in the method section in addition to the references to previous papers), which should reduce the bias, but I don't see any other reasonable explanation. More discussion on the actual cause should be included. In addition, the reduction in the difference between the two HTDMA's (1 and 2) with increasing SS should be explained and discussed, could these two issues be related?

Figure 3. The difference between the two HTDMA instruments is significant and merits an explanation in the manuscript, different residence times? Design issues, something else?

P4, L310 this gives an impression that all studies cover the whole period, however, quite short periods of time are covered by each campaign, ranging from few weeks to $\sim$2 months, and this should be specified. Which also suggest that conclusion in L279-285 and 310-313 should be toned down ... Yes, the range of locations is impressive, however, the short term of observations could limit the type of aerosol measured during the campaign. This is one of the most important conclusions in the paper, so requires more detailed discussion and comments. It should be illustrated by specific examples. Give details and references how the campaigns covered in this study are representative of the location.

Space is not limited here; therefore, more elaborate discussion on extreme cases (eg. London winter and Chilbolton at lowest SS) should be included and reasons for a bad

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reconciliation explained.

Specific comments: L156-158: Which calibrations? Why disagreed? More details needed. Figure 1. Why this figure includes locations that were not discussed in this manuscript? Figure 2. Explain shaded areas in the caption. D319 cruise is the Discovery cruise? Be consistent.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 9783, 2014.