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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric Cluster Dynamics Code: a flexible method for solution of the birth-death equations" *by* M. J. McGrath et al.

Anonymous Referee #3

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Generally a well written manuscript with important new findings and methods to explore the initial steps of atmospherically relevant neutral cluster formation from cluster-monomer collisions and cluster-cluster collisions. The text is easy to follow and well structured. I recommend that the manuscript should be accepted once my comments have been correctly addressed.

Major comments:

Section 2.2 contains a detailed discussion of uncertainties concerning ionic-cluster formation but in the result section no results (e.g. sensitivity test of different cluster formation enhancement factors) are presented. Either you should include such results

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or you should remove the detailed discussion of the model uncertainties concerning ionic-cluster formation.

Since this study rely on the results from the Vehkamäki et al., 2011 study this manuscript should at least be submitted before the manuscript can be accepted.

To me it is not clear how you determined the free energy of formation of clusters. You write that with ACDC you can calculate the free energy with any method, but exactly how do you do it in this study and what are the uncertainties?

Minor comments:

I don't exactly understand what you want to say with the sentence which starts on line 14 in the abstract:

"In particular, the temperature and sticking probabilities both have a large impact on all clusters, while the boundary effects (allowing clusters to grow to sizes beyond the largest cluster that the code keeps track of, or forbidding such processes), coagulation sink terms, non-monomer collisions, and monomer concentrations can all have significant effects."

Do you mean that the temperature and sticking probabilities always have large impact on all the clusters while the boundary effects, coagulation sink terms, non-monomer collisions, and monomer concentrations sometimes can have significant effects?

Consider reformulating this sentence so that it is easier to understand.

Section 2, page 6, line 12-14: What do you mean with the sentence:

"However, given that the generation of the equations in ACDC is done by a Perl script, there is not a lot of extra effort required to include these clusters."

Do you mean that it is not a lot of extra effort for the person which uses the code or that the computer time is not significantly altered? I expect that you mean that it is no large effort for the user. Please specify.

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You mention at several places in the text that you use a simulation time of 50 000 s. Do you then mean model time or actual computer time. I assume that you talk about the model time. Please specify.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 25263, 2011.

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