

Interactive comment on “An inverse modeling procedure to determine particle growth and nucleation rates from measured aerosol size distributions” by B. Verheggen and M. Mozurkewich

B. Verheggen and M. Mozurkewich

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Both referees suggest that we should make the computer code available to aid other researchers in using this method. We agree with the spirit of this; however, it is somewhat problematic in that the program is not written as subroutines in a standard programming language and does not have a user interface. As a result, it is not straightforward for others to use “off the shelf”. So we are concerned that by simply posting the existing code we will create a technical support problem. It is envisaged to make the program more user friendly by re-programming certain parts and by creating a user interface,

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after which the program (interface and code) will be made available via the internet. However, this constitutes a future project for which funding is currently sought. Of course, we are willing to share the program code if requested, provided that we have a clear understanding with prospective users as to what is expected in terms of support.

We thank the reviewer for pointing out a number errors and places where the text was unclear. We will make appropriate corrections and revisions. Replies on discussion items are given below.

Response to minor comments of Referee #2:

Page 1687, lines 19-22. Representativeness of Hamaker constant. We are not aware of measurements of the dependence of the coagulation rate on chemical composition, but this dependence is not expected to be strong. We will add the following sentence to the revised text: "Organic particles are expected to have somewhat smaller Hamaker constants, but the dependence of coagulation rate constants on the Hamaker constant is not strong for Hamaker constants larger than $1e-20$ J. Our analysis suggests that the coagulation rate constants may be underestimated."

Page 1689, lines 11-13. Importance of within mode coagulation. We will add the following sentence addressing this issue to the revised manuscript, page 1706, line 11: "Since these corrections for within-mode coagulation are approximations, they bear a relatively large uncertainty. It is clear that if these correction factors are large (e.g. exceeding a factor of 5), the resulting values of the nucleation rate become highly uncertain, since such rapid within-mode coagulation could have erased a clear relationship between the number of nucleated and the number of measured particles."

Page 1694, lines 21-25. Uncertainty in the coagulation rate. We wrote in our manuscript: "We have no explanation for the surprisingly large coagulation rate constants found in this analysis." We expect that uncertainties in the measured size distributions would have translated into more noise, not into a clear signal in one direction (i.e. larger coagulation rates than according to theory). If we speculate about the poten-

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tial reasons, we could think of electrostatic effects, or inefficient or perhaps too violent mixing; but none of these seem really plausible. Since we have no basis to check the relative merits of these processes, we decided to not include such speculations in the manuscript.

Page 1696, lines 17-22. Size dependence of coagulation multiplier. We do not claim that the coagulation multiplier is size dependent; we state that it might be, and that there are indications that it does have some size dependence. There is no reason to assume it to be constant with particle size. Mentioning potential reasons for this size dependence would again be mere speculation without any basis. To avoid confusion we will delete the words “be expected to” in the revised text (page 1696, line 18).

Bart Verheggen and Michael Mozurkewich

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