

## ***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***

### **Anonymous Referee #2**

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#### General:

This manuscript introduces a new method for determining the nucleation and growth rates of aerosol particles from measured particle number size distributions. The new method is very general and a clear step forward compared with earlier methods developed for the same purpose. The approach is scientifically sound. The manuscript is well-written and relatively well structured. My only major criticism come from the fact that it is very difficult for other researchers to apply this method based on the infor-

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mation given in the paper. On the other hand, I see no easy solution to enhance the description of the method to a sufficient level without lengthening the paper too much. Besides this, I have only a few minor comments that should be addressed.

Minor comments:

Page 1686, line 9. It is stated that the size dependence of  $\gamma(r)$  disappears for small particles. The authors should be more specific here. At which size does this factor deviate significantly from unity? Can we neglect this factor when analyzing typical nucleation and growth events?

Page 1687, lines 19-22. The authors assume a Hamaker constant representative of sulfuric acid particles. How sensitive the method is for value of Hamaker constant? How well the Hamaker constant of sulfuric acid particles imitate that due to other particle types, such as organic particles that may also be important.

Page 1688, lines 20-25. It is unclear whether a linear or logarithmic sizing is applied when using the particle size bins and average particle sizes in each bin.

Page 1689, lines 11-13. The authors should briefly explain when (under which conditions) it is justified to neglect the “within mode” coagulation of particles smaller than the minimum detectable size and when it is not.

Page 1694, lines 21-25. Can the authors give any reason for the observed uncertainty in the coagulation rate. Is it due to the effect of inter-particle forces (van der Waals forces or other forces affecting the coagulation rate), or due to uncertainties in some input parameters associated with observational data?

Page 1696, lines 17-22. It is stated that coagulation multiplier is expected to vary with particle size. Why? Is this due to size-dependency of inter-particle forces or due to some other factors?

Page 1697, lines 12-24. Although the regression analysis is not sensitive to  $\alpha$  (accommodation coefficient), the calculated sulfuric acid concentration is. This should be

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mentioned here.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1679, 2006.

**ACPD**

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