

Interactive
Comment

Interactive comment on “A semi-analytical method for calculating rates of new sulfate aerosol formation from the gas phase” by J. Kazil and E. R. Lovejoy

Anonymous Referee #1

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General

The manuscript by J. Kazil and E.R. Lovejoy presents a parameterization for the formation of neutral and charged sulfate particles which is based on numerical and experimental achievements. This parameterization is computational inexpensive and an important tool, possible to be implemented in regional and global models. The scientific relevance of atmospheric nucleation mechanisms was reflected in the last IPCC report 2007 and the topic of this manuscript is highly relevant, completely in the scope of ACP and important for the scientific community. I would highly recommend that this article will be published in ACP after some minor corrections and additions.

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Comments:

Part one of the manuscript gives a very detailed description of the theoretical model construction and does not need any further corrections. However, the second part in detail chapter 8 'Error analysis' could be improved in several ways. Hereby I will not force the authors to include these advices but more encourage them to think about the possibility if the readers could benefit from it.

First I believe a table explaining the different computer simulations performed for chapter 8 would be helpful to get an easier overlook. Although the authors try to describe all runs and the outcome in detail a more clear way at least for some readers is a simple table including the model set up and the results.

Second the authors use wide ranges for the input parameters of ionization rate, relative humidity, preexisting aerosol H₂SO₄ condensational sink, temperature and sulfuric acid concentration for the simulations in chapter 8. In ACP we have the nice possibility to include color pictures and I would recommend that the authors should use this possibility and include in figures 4-7 a color-code to mark the most important parameters (e.g. sulfuric acid concentration below 10⁴ in blue and higher in red). This is of course not possible for all parameters and the authors have to focus on the parameters which are most interesting for each run.

In the conclusion it would be interested to include some comparison of the calculated nucleation rates with the results from other published nucleation theories. Further the authors should point out the importance of ion-induced nucleation of sulfuric acid and water for different areas and latitudes like e.g. land - ocean, mixed layer- free troposphere, tropics - northern latitudes.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2169, 2007.

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