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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol indirect forcing in a global model with particle nucleation" *by* M. Wang and J. E. Penner

M. Wang and J. E. Penner

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We are grateful for Dr. Kazil's comments. Our response is in bold.

J. Kazil

In your simulations, you use cluster activation theory (Kulmala et al., 2006), parameterized based on measurements over a forested continental site (Hyyti?l?) to describe aerosol nucleation. Cluster activation theory postulates that clusters containing one sulfuric acid molecule and some other compound(s), possibly an organic molecule from BVOC oxidation, initiate nucleation. What justifies the assumption that cluster activation works the same way over remote oceans as over the boreal forest?

We added a reference to Kuang et al. (2008) to the text to justify our use of this parameterization over the oceans and we also add more discussion of the uncer-

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tainties in the nucleation mechanisms the text about (see our answer to question 2 from Referee #1). Since the exact nucleation mechanism behind particle formation is still poorly understood and since the empirical parameterization has been shown to be a good representation for nucleation events at various atmospheric locations, this empirical parameterization is a reasonable choice for use in a global model. But we do recognize the uncertainties in the mechanisms (section 2.2), and discuss some implications (section 7).

(Please check the spelling of Sihto et al. (2006) in the text.)

Thanks. Corrected.

References

Kulmala, M., K. E. J. Lehtinen, and A. Laaksonen (2006). Cluster activation theory as an explanation of the linear dependence between formation rate of 3nm particles and sulphuric acid concentration. Atm. Chem. Phys. 6(3), 7878211;793.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 13943, 2008.