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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A parameterization of size resolved below cloud scavenging of aerosols by rain" *by* J. S. Henzing et al.

Anonymous Referee #1

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General comment

This study presents valuable contributions to the below cloud scavenging of super-micron particles: a) a parameterization of the scavenging coefficients as function of aerosol size and rainfall rate; b) simulations using the new scheme in a global transport model to asses the impact of below cloud scavenging on super-micron sea salt aerosols. Various possible uncertainties in precipitation, relative humidity, and water uptake by aerosol particles are discussed, and the level of detail given is useful for similar studies. The study concludes that below cloud scavenging is likely an important sink for super-micron sized sea salt aerosol particles that needs to be included in aerosol models. Overall, the authors provide an interesting framework, and a concrete

application valuable for treating sea salt aerosols in large scale models. The paper is suitable for ACP, and I recommend the paper for publication after some suggested revisions in the final manuscript as described below.

Specific comments

Detailed attention has been given to the treatment below scavenging by rain of sea-salt super-micron particles. Since the simulation presented is for one year, I would suggest to include in your revised paper a discussion of the following aspects: a) during winter time, especially at high latitudes and near coastal areas, precipitation can be in the form of snow (snowfall instead of rainfall); b) discuss the differences between rainfall and snowfall size distribution, and the impact on scavenging coefficients; c) give some qualitative assessment on how including snowfall related scavenging coefficients can affect various regions where snowfall is significant. I see this discussion relevant for your section on uncertainties, as well as for future work, especially for applications at high latitudes, winter conditions near coastal regions. The reader should get an idea on how important solid precipitation might be for below cloud scavenging of the sea salt aerosol.

Editorial comments:

References

The reference to Andronache, which appears in the Reference list, should be included in the text of the article, perhaps in the introductory material. Please check.

References, page: 1375, please correct the spelling for Marshall, J. S. References, page 1375, please correct the title of the book by Pruppacher and Klett: Microphysics of clouds and precipitation.

References, page 1375: The reference to Rasch, P. J. must add “et al.”, or the first three authors and “et al.”. Please check.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1355, 2006.