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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effect of hygroscopic seeding on warm rain clouds – numerical study using a hybrid cloud microphysical model" *by* N. Kuba and M. Murakami

Anonymous Referee #1

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Overall the content of the manuscript is suitable for publication in ACPD. The paper is generally well written although I recommend a shorter snapier title. The paper presents results of simulating hygroscopic seeding with a range of aerosol concentrations and sizes of aerosols. The smaller flare type aerosols compete with natural aerosols thereby producing larger cloud droplets that eventually produce rain by collision and coalescence. They also simulate seeding with giant CCN which serve as embryos to initiate collision and coalescence.

The model deployed is a very sophisticated microphysics model but it is used in a kinematic flow field that does not allow dynamical feedbacks associated with entrainment,

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subcloud evaporation, and cold pools which impact the potential response of clouds to varying aersols. These limitations should be clearly stated in the introduction as well as in the conclusions.

Many of the results are consistent with previous modeling results, some are relatively unique to this study.

I think the discussion in section 3.3.1 can be interpretted in terms of Taffe Bowen's(1950) model in which larger drops formed on GCCN have lower trajectories in the cloud than smaller drops formed on smaller CCN. The result being the lowered trajectory drops fall out of the cloud as smaller raindrops which can lead to reductions of rainfall noted.

Likewise in the conclusion section, the use of the Taffe Bowen concept might be useful in discussing the radar results. I think a bigger deal can be made out of the discussion of radar-estimated rainfall if they interpretted the results in terms of the size distribution of raindrops as well as rainfall amounts.

In summary, while one must be careful of overinterpreting the results of this paper owing to its dynamical limitations, the paper with minor changes should be suitable for publication.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24145, 2009.