Atmos. Chem. Phys. Discuss., 9, C9140–C9141, 2010
www.atmos-chem-phys-discuss.net/9/C9140/2010/

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 #2

Received and published: 2 January 2010

General comments:

This manuscript describes numerical simulation of the effect of hygroscopic seeding on warm rain clouds. A 2D kinematic framework combined with bin-resolved treatment of condensation and collision-coalescence processes are used. The results are to some extent similar to that of previous studies although some are unique in this study. The subject is well fit the scope of this journal. It should be publishable if the following points are clarified in revision.

Specific comments:

1. The kinematic framework used by Szumowski et al. (1998) was developed based on

measurements of marine clouds over Hawaii. Does the thermodynamic and dynamic structure of that cloud type represent the warm clouds developed over other geographic locations?

2. Both stochastic and continuous coalescence schemes are considered in the same model. Does this scheme overestimate the efficiency of collision-coalescence?

3. Feingold et al. (1989) scheme was a numerical solution to stochastic collision-breakup of drops. How the breakup of drops formed by continuous coalescence process is treated in this model?

4. The seeding effect is also very much dependent on the time and location of the seeding practice. Are the conclusions of this study sensitive to changes in these parameters?

5. In previous field experiments, seeding materials are generally more water soluble than natural aerosol particles. For example, KCl is the main chemical component of South African flares. NaCl is assumed for both the natural and seeding particles in this study. Will the conclusions be different if KCl is assumed for seeding material and ammonium sulfate for natural aerosol?

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