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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Does the threshold representation associated with the autoconversion process matter?" *by* H. Guo et al.

Anonymous Referee #2

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This is a well-designed study of the sensitivity of simulated clouds to the treatment of the autoconversion of cloud water to precipitation. A physically-based treatment expresses authoconversion in terms of two parameters: the droplet dispersion and the critical radius for autoconversion. Although the instantaneous cloud fraction, liquid water path and aerosol indirect effect exhibit significant sensitivity to the treatment of autoconversion, the time mean over a day is much less sensitive except with unrealistically large values of the critical radius. The presentation is compact and clear, with only a small amount of further explanation required.

Comments

1. How much of the sensitivity of AIE is due to the dependence of autoconversion on

dispersion and how much is due to the dependence of cloud optical depth on dispersion?

2. Figure 3 caption. Change "ration" to "ratio".

3. Figure 4. Why is x_c larger for the polluted case?

4. Page 8, third paragraph. The entrainment drying explanation has also been identified by Ackerman et al. (Nature 2004) and by Bretherton et al. (GRL 2007).

5. Page 8, lines 23-27. Alternately, one might conclude from this that using a 10 micron critical radius is sufficient in the time mean.

6.Page 8, last two lines. A value of 20 microns for the critical radius is unrealistic, so why present it?

7. Page 8. Are these conclusions any different for the polluted case, which exhibited greater sensitivity to dispersion than the clean case does? Is there any evidence that a fixed 10 micron critical radius produces bias in any results other than at small scales?

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 16055, 2007.