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Interactive comment on "Parcel model simulations of aerosol – warm phase cloud microphysics interactions over the Amazon" *by* A. A. Costa and S. Sherwood

Anonymous Referee #1

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In this paper, the authors investigate the sensitivity of warm rain height to the presence of giant and ultragiant CCN, to updraft speeds and to different thermodynamic conditions using a cloud parcel model. The warm rain height is defined by the height at which the modal liquid water diameter reaches a size of 24 microns. A parcel model initialized with a constant updraft speed does not realistically simulate this height. The updraft speed changes with the release/absorption of latent heat during the condensation/evaporation processes and with the fall of the raindrops. Do the changes of updraft speed have a negligible effect on the predicted warm rain heights in this study?

One of the results of this study is that giant (GCCN) and ultragiant (UGCCN) CCN are important in polluted clouds over the Amazon. From Fig. 1 is difficult to understand the characteristics of the giant and ultragiant CCN populations: mean diameter, concentration. I suggest the addition of all these information in manuscript together with the reasons for which the present GCCN and UGCCN populations were chosen. I also suggest a discussion of the warm rain height sensibility to the characteristics of GCCN and UGCCN populations.

Fig. 4 shows the mass drop spectra simulated with the parcel model for clean and polluted environment. Which are the initial conditions of the simulations? Is it used the same aerosol number size distribution, vertical velocity but different thermodynamic conditions? If the answer is yes, I suggest to the authors to discuss the Fig. 4 in Section 6 and to add the Section 6 after the Section 3. This will help in showing the effect of GCCN and UGCCN on the mass drop spectra, in the same environmental conditions and for a given aerosol number concentration.

Section 5 does not contain any motivation for the range of vertical velocities used in the simulations. It should be added.

In the Section 8, par. 2, line 23, the authors conclude “the vertical velocity in polluted environment might play a double role Ĕ”. I do not see which simulations support this conclusion.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 481, 2005.