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Interactive comment on “Understanding the contributions of aerosol properties and parameterization discrepancies to droplet number variability in a Global Climate Model” by R. Morales Betancourt and A. Nenes

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We thank the reviewer for the positive, thoughtful feedback and constructive comments that improve the manuscript. Although the global mean SWCF produced with the different schemes are similar across simulations, the varying response of the parameterization to perturbations explains some marked regional differences in droplet number concentration, with a consequent impact on the cloud microphysics. The reviewer's comments are in italics, followed by our responses.

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“For example, it was not clear to me why the figures and tables did not include the results from the ARG scheme. . . .”

The reasons for this choice are now discussed in the manuscript. Firstly, it has been shown that aerosol activation is not strongly affected by α_c when it is in the range between 0.1 and 1. Secondly, a recent study by Raatikainen et al., 2013 suggest that the value of α_c is closer to the lower value of 0.1. Finally, we wanted to compare all the parameterizations using the same set of parameters, and the ARG parameterization cannot simulate the dependency on α_c . Its inclusion was only made for completeness since it is the default value used in the release version of CAM. This is all now explained in the manuscript.

The notation used is also not consistent (ARG and ARGalpha are used interchangeably)

This issue is now corrected.

Table 2 has the same entry twice.

The typo was corrected. Second line first column now reads “PI” instead of “PD”.

In summary, proper proof-reading is what is missing to make this manuscript publishable

We apologize for these oversights! We carefully went through the manuscript, corrected typos and improved its writing wherever we thought necessary.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31479, 2013.

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