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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of parametric uncertainties on the present-day climate and on the anthropogenic aerosol effect" *by* U. Lohmann and S. Ferrachat

Anonymous Referee #2

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This study quantifies the dependence of the anthropogenic aerosol radiative effect on the values of several key cloud parameters that are often used to tune climate simulations to achieve global planetary energy balance. It finds surprising small dependence on the cloud parameters. However, it does not address the dependence on other parameters such as those governing aerosol properties and distribution (new particle formation, scavenging, emissions, mixing state, ice nucleation). The presentation needs to be more clear on this.

Minor Comments

1. line 4. Change "These processes are thus used as tuning parameters" to "The

uncertain parameters in the representation of these processes are therefore adjusted".

2. Line 17. Change "They" to "These cited studies". What does "initially" refer to? The first studies? The dawn of the industrial era? The beginning of a climate simulation?

3. Line 40. Should cite instead Abdul-Razzak and Ghan (2000), which is the modal parameterization, and Fountoukis &Nenes (2005), also a modal parameterization.

4. Line 41. Abdul-Razzak and Ghan is also used in the GISS MATRIX model (Bauer et al., ACP 2008), SPRINTARS (Takemura et al., JGR 2005), and NICAM (Suzuki, GRL 2008). Nenes is used in GLOMAP (Pringle et al., ACP 2009) and GEOS5 (Sud et al., Annales Geophysicae 2009). There is also Ming's (JAS 2006) physically based scheme, which is used in the GFDL AM2 (Ming et al., JAS 2007) and AM3 (Salzmann et al., ACP 2010).

5. Line 46. Replace "impact on climate, they" with "impact on cloud water and hence the planetary energy balance, parameters used to represent them".

6. Line 71. Insert "the same" after "specified".

7. Line 86. Replace "became" with "become".

8. Line 92. Insert "have" before "received".

9. Lines 95-96. Make it more clear that this estimate by Pan et al. is the parametric uncertainty.

10. Line 99. Replace "parameters" with "parameter".

11. Lines 103-104. How does this study differ from previous studies?

12. Line 130. Insert "present day" before "climatological ".

13. Line 219. I don't think reduced convective heating explains the decrease in cloud ice with increasing entrainment. Wouldn't the mechanism be reduced detrainment of condensate? This is mentioned in the next sentence. Why mention convective heating

at all? Reduced convective heating won't reduce cloud ice.

14. Line 259. This would be a good place to discuss uncertainty due to uncertainty in parameters controlling aerosol properties and distribution, such as emissions, new particle formation, scavenging, and ice nucleation.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 19195, 2010.