Atmos. Chem. Phys. Discuss., 12, C9756–C9758, 2012
www.atmos-chem-phys-discuss.net/12/C9756/2012/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Host model uncertainties in aerosol radiative forcing estimates: results from the AeroCom prescribed intercomparison study" *by* P. Stier et al.

Anonymous Referee #2

Received and published: 24 November 2012

General comments:

Recently, not only AeroCom project but also other communities have tried to understand performances of aerosol transport models by comparing with multi-model results and observations. As the authors notice, we need to start to do both inter-comparison and intra-comparison among the models. In this sense, this manuscript is quite suitable for further understanding and development of the models. It is worth investigating uncertainties of non-aerosol parameters (i.e., surface albedo, cloud fraction, and radiative transfer code including distributions of both gases and clouds) in aerosol radiative forcing estimates. As for the radiative transfer code, a companion paper of Randles et

al. (2012) is discussing, so in the present study the authors focus on surface albedo and cloud fraction. In the manuscript the purpose and logic are good, but I have one major comment. I think the authors need to explain the differences in spatial distribution of surface albedo and cloud fraction between models (corresponding to Fig. 2-15) in terms of the difference in the modules.

Specific comments:

1. P25943, L25: Please add a module description for surface albedo and cloud fraction in Table 2.

2. P25494, L5: How many periods and/or which years did you calculate? How about the difference in meteorological fields among models? Especially water vapor can be critical to determine cloud fraction. Please clarify or discuss them somewhere.

3. P25495, L3: Could you explain why the simulations differ over these areas? Is it possible to explain them in terms of a difference in the cloud module?

4. P25494, L22: The models without aerosols simulate the cloud fraction in Fig.2. Originally, how much is the cloud fraction changed if the models with aerosols? It depends on how strong interaction between aerosols and clouds each model takes into account.

5. P25496, L4: Could you show figures for the mean and standard deviation among the models? The mean and standard deviation may be enough for your statement in the manuscript. This comment is common in Fig.2 to Fig. 15. These figures are absolutely helpful for reader to understand the model performance and variability.

6. P25501, L14: The shading in Fig. 19 is rather difficult to see it. First please enlarge these figures. Second please use proper color ranges. I think narrower range is better here. I cannot judge which is positive or negative in these figures.

7. P25501, L21: I suggest that the authors also discuss it in terms of shading regions and other regions.

8. P25503, L28: In Figs. 21 and 22, did you take into account the interaction between aerosol and cloud? In this case, how did you treat the interaction in each model? In addition, could you show new figures of the mean and standard deviation or change the range to easily find the difference between models.

Technical comments:

1. P25490, L8: references are required.

2. P25490, L9-10: Is the paper "Mann et al. (2012)" still in preparation? I suggest published or accepted papers are preferred here.

3. P25495, L9: Is a global mean 0.21 or 0.203 in Fig 3? Which is correct?

4. P25499, L21: Which (2.65 in text or 2.62 in Fig, 17) is correct?

5. P25499, L26: Which (2.81 in text or 2.90 in Fig, 18) is correct?

6. P25507, L13&14: W-2 -> Wm-2

7. P25540: The caption is almost same as that in Fig. 21. I think it is easy to understand these figures when the authors shorten it like "Same as Fig, 21 but for all-sky". I also recommend the authors to shorten the caption in Figs. 6 – 15.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 25487, 2012.