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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of harmonized emissions on aerosol properties in global models – an AeroCom experiment" *by* C. Textor et al.

C. Textor et al.

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General reply

Referee #1 has the impression that "The paper definitely suffers for looking like an electronic supplement to the previous paper by same authors." We disagree with this statement. The present paper shows that the differences in the emissions alone cannot explain the differences in the simulated aerosol fields, but other reasons like the internal model physics play a major role. We wanted to point out that major improvements of the aerosol parameterisations including transport pattern are necessary in order to decrease the uncertainty of the fate aerosols in the atmosphere (see also our response to the S. Metzger's comment). This is the message we wanted to bring across with the present article. Consequently, we did not go - again - into a detailed analysis of the model differences (as this has already been done in the first paper), but focused on the

effect of emissions.

In the revised version of the article we try to be more focused on our main finding. However, in order to respond to the demand of both reviewers we added an electronic supplement containing the figures for the analysis performed in paper I for the two experiments, in order to allow the interested reader to compare the two experiments for specific models.

The referees ask for general information on the model setup given in the Textor et al. 2006 paper (referred to as paper I in the following). We added a table on the model configurations (Table 2 of paper I).

We also added a more detailed discussion on the possible causes of the remaining disparities and indicated research directions we think have a high priority to improve global aerosol simulations.

Anonymous Referee #1

1. How much of the other (plotted) aerosol parameters are affected by the changes in model set-up? We revised our analysis and excluded all results UIO_GCM from the statistics. UIO_GCM aerosol microphysics is represented by internal mixtures of the different aerosol types. Hence, the not using AeroCom ExpB emissions affects the results for all other species as well. By contrast, although in MATCH AeroCom emissions were not used for SS, but this model is based on external mixtures, hence the aerosols are treated independently and the results for the non-SS species are considered in the statistics.

In the figures, we shaded the models that have not been used for the statistics.

2. Figure 1 would also otherwise be greatly improved by some knowledge of WHICH models actually have the largest differences in modeled diversities. This information can be found in the supplement now.

3. Why have the authors not done all the different analyses they did in the previ-

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ous paper (Textor et al, 2006) to this case with harmonized emissions? We added the respective figures in the electronic supplement and some comments in the paper. Additional information can be found on our web site http://dataipsl.ipsl.jussieu.fr/cgi-bin/AEROCOM/aerocom/synthesis_annualrs.pl

4. How did fine/coarse split change with the common emissions? This is indirectly mentioned in section 3.4, but more detailed discussion on the subject is needed. We do not have information about the initial particle size distributions, but only on that present during the simulation, resulting from the initial sizes and the simulated processes. A figure on the split between three size classes is added in the supplement together with the respective diversities in the two experiments. A discussion can be found in the paper.

5. Explanations on implementation of emissions (inaccurate, intermediated AeroCom data) added

6. Explanation figures in supplement added on effect of "...differences in precursor gas emissions.." on diversity of sulphur cycle. 7. Explanation on choice of 5 km altitude as limit added. We did not discuss additional layers as this was done in paper I and does not add information on our main hypothesis. A respective figure is added to the supplement.

7b. How do the horizontal dispersal change in other parts of the domains? Discussion and figures in supplement added

8. Differences in different model approaches. Discussion added

9. Number concentration changes We did not analyse the number concentrations but it would certainly an interesting to do so in a later study.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 1699, 2007.