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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 #2

1. Some sources of diversities between models are listed in section 3.4 (page 1707, lines 14-16) which is the most important? Discussion added

2. What do the authors mean with 'small impact' (page 1701, line 6)? How much %? We cannot give a single number here as the diversity concerns different quantities. In addition, the numbers we could give for each of these would depend on the definition of the 'model diversity', see discussion in paper I. Therefore we restricted our selves to this qualitative statement.

3. Be more precise in "ambiguities in the implementation" (page 1701, line 14) Done.

4. Why there is no significant improvement from expA to expB? Can the authors identify the main reason /critical process of discrepancies and provide relative contribution to the total diversity of the models? Discussion extended. We cannot pin down single reasons as all processes are interconnected and additional studies necessary.

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5. How the 20% model diversity in the load to dry aerosol (figure 1) is translated to optical properties, aerosol optical depth? The discussion of optical properties is not subject of this paper. We added a short comment, and a figure in the supplement, additional Information can however be found on our web site.

6. There is a number of choices in measures for the model intercomparison that have been discussed in the earlier paper, like the use of LoadAltF and LoadPolF (given in Tables 1-6 but never defined in the present paper) that need to be justified briefly in the present paper (end of section 3.3), in particular when taking into account that they refer to less than 50% of the aerosol mass. The captions of the tables have to be improved to define the quantities given in the tables. Done

7. In Section 2 (last sentence), the authors need to provide some basic information on how the simulations of the 4 models providing 5-year averages are done, in terms of emissions and meteorological data. This has to be given in the present paper to allow evaluation of the results. Done

8. Page 1710, lines 23-25: What has been improved from ExpA to expB? Figure 1 shows some improvements that can be quantified and certainly Figure's 3 data can provide additional input to this question. "Improvement" would imply better representation of the observations. Therefore, the term "improvement" is not applicable for the results presented in our study, as we did not compare the model results to observation here. A discussion on the degree of agreement among models as a result of unifying the emissions is provided.

9. Also in Figures 2 and 3b I miss the AER of the models: How the residence time of the total aerosol changes from one experiment to the other? And what agreement do models have for expB? Information on AER added.

10. There is also a small number of typos that can be corrected with careful re-reading like those, page 1705, line 5; page1706, line 26; page 1708, line 5; page 1709, line 14 and line18. Done

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Interactive Comment

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