Atmos. Chem. Phys. Discuss., 7, S850–S852, 2007
www.atmos-chem-phys-discuss.net/7/S850/2007/

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.

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Received and published: 29 March 2007

The AeroCom experiment is without doubt an important, however, precarious exercise, if the results are not interpreted with care and used to influence general research directions.

The reason for this comment is the following statement by Textor et al., 2007:

(1) Citing Textor et al., line 5-10: "Surprisingly, harmonization of aerosol sources has only a small impact on the simulated diversity for aerosol burden, and consequently optical properties, as the results are largely controlled by model-specific transport, removal, chemistry (leading to the formation of secondary aerosols) and parameterizations of aerosol microphysics (e.g. the split between deposition pathways) and to a

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lesser extent on the spatial and temporal distributions of the (precursor) emissions."

From this statement, the less specialized reader may get the wrong impression that the emissions aspect is of subordinate importance (e.g. such as chemical speciation) in aerosol modelling. We have noticed from several discussions, and also the comment of referee #1 (ACPD 7/7/1699/2007), that this impression is catching on in the community:

Citing anonymous referee #1: "I find the paper rather interesting, especially as it suggests that the differences in mass emission rates do not contribute too much to the aerosol model disparities"

The statement (1) is, however, highly premature, not only because emission estimates are uncertain, but in particular because global aerosol models tend to neglect chemical properties of particles by defining categories such as “sea salt”, “mineral dust”, “organic aerosols”, “biomass burning aerosols” etc. The chemical composition of primary particles largely determines their hygroscopicity, which in turn largely determines (together with external factors such as meteorology, orography) the evolution of the ambient aerosol size-distributions, and subsequently the aerosol optical properties, aerosol-radiation and cloud feedbacks.

This important link between chemical composition and hygroscopicity is not (yet) consistently considered by the in AeroCom participating models.

Statement (1) is furthermore contradictory with another statement by Textor et al. (2007) - one we agree with, i.e.:

(2) Citing Textor et al., line 16-20: "These results indicate the need for a better understanding of aerosol life cycles at process level (including spatial dispersal and interaction with meteorological parameters) in order to obtain more reliable results from global aerosol simulations. This is particularly important as such model results are used to assess the consequences of specific air pollution abatement strategies."

Therefore, we urge the AeroCom community to rethink formulation (1) in view of its

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important role and visibility in the modelling community.

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