

Interactive comment on “Global 2-D intercomparison of sectional and modal aerosol modules” by D. K. Weisenstein et al.

D. K. Weisenstein et al.

Received and published: 22 March 2007

1. This study "should clearly narrate why a 2-D model is used instead of 3-D, and what we can learn from the 2-D study in the future 3-D applications."

We added to paragraph 6 of Section 1 the following: "The 2-D study is performed prior to implementation of aerosol microphysics in the stratosphere-troposphere GMI for efficiency. While details of tropospheric chemistry and transport are missing here, the stratospheric results in 2-D should not differ appreciably from stratospheric results in 3-D. Thus we focus most of our intercomparisons and comparisons with observations on the stratosphere." When aerosol microphysics have been implemented in the strat-trop version of GMI, we will repeat some of these studies but with only 1 version each of the modal and sectional models. The computational efficiency of the 2-D model allows us to explore 6 model versions in this paper.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

2. Page 1, "More recent models" should not include Whitby et al., 1991.

We have replaced the Whitby reference with Wilson et al., 2001; Liu et al., 2005; Stier et al., 2005.

3. Page 2, non-sulfate particles such as from biomass burning in boreal regions could inject smoke aerosol into the stratosphere.

We appreciate this observation, though such smoke injection is seen only in the lower-most stratosphere and, I believe, isn't known to influence the stratospheric overworld. Our statement that "non-sulfate particles are not important in MUCH of the stratosphere and therefore are generally omitted" acknowledges this, as well as influence of other particle types (probably organics) in the lowest few kilometers of the stratosphere, and nitric acid in the cold regions. Creating a GMI model which can span the troposphere and stratosphere when dealing with aerosol microphysics is a necessary step in dealing with the additional complexity that the reviewer is well aware of.

4. Showing "total sulfur" in Figures 4 and 5 is meaningless.

Our intention in showing total sulfur was to minimize differences due to condensation and evaporation rates. However, the reviewer's point is also obvious and we have removed Figures 4b and 5b and combined Figures 4a and 5a into a new Figure 6.

5. The definition of the percentage in Figure 5b should be clarified.

Modified the description of this figure to read: "Figure 5b shows a comparison of aerosol mass density calculated by the UMaer-3mA model without sedimentation versus the AER40 model without sedimentation." The figure caption now reads: "Percent difference in annual average model-calculated aerosol mass density between the UMaer-3mA model without sedimentation and the AER40 model without sedimentation." We are plotting $((\text{UMaer-3mA-nosedimentation}) - (\text{AER40-nosedimentation})) / (\text{AER40-nosedimentation}) * 100$.

6. Reviewer suggests use of the same color convention in all figures for consistency.

Excellent suggestion. We have revised the figures accordingly.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 12729, 2006.

ACPD

6, S7319–S7321, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper