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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulations of preindustrial, present-day, and 2100 conditions in the NASA GISS composition and climate model G-PUCCINI" *by* D. T. Shindell et al.

D. T. Shindell et al.

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We thank the reviewer for their detailed suggestions on ways to improve the paper. We found the comments quite useful, and have endeavored to revise the paper in accord with both the general and specific comments.

The general comments of the reviewer were to consider splitting the paper into two parts and more specifically to better separate the general model discussion from the specific experimental setup. We felt it was late to split the paper, and that a pure 'model documentation' paper would not be terribly interesting to many readers, so have kept the paper whole. However, in response to the comments of this and other reviewers about its length, we have shortened it considerably, removing the discussion of the

alternate A1B scenario from the climate runs portion and removing much of the discussion of sulfate aerosols, CO and NOx deposition, all of which have been published elsewhere. We hope that the removal of these sections and their accompanying 4 figures has made the paper more manageable for readers.

To address the issue of the general versus specific, and to in general clarify the setup used in the runs, we've combined all the specific discussion of experimental setup into a new section (2.4) at the end of Section 2 (Model description). We've also revised Table 3 on the experimental setup of the various runs to show clearly which are the runs performed to evaluate the model against observations, and which are the climate experiments. With the removal of the two A1B runs that had different setups from their A2 analogues, the setup of the various runs is now much simpler to follow, we feel.

Specific comments:

1) We use JPL-2000 reaction rates for consistency with Fast-J2. We will move to updated rates when we have the appropriate cross-sections for Fast-J2 as well.

2) We have added the values for the PSC temperature thresholds, as suggested. As the reviewer suggests, the Hanson and Mauersberger formulation does not really simulate particle growth per se, so that phrase has been removed.

3) The photolysis rates are interactive with the dust, which is now clarified in the text.

4) We've added a specific list of which chemically active gases are also radiatively active, and noted that NO2 is not among them in our model.

5) We've added a description of how bromine totals are set, and added the suggested additional information and clarifications for chlorine. Natural chlorine is set only in the stratosphere. The bromine total follows WMO, so includes natural and anthropogenic sources. The use of a CFC-11 proxy for anthropogenic chlorine works reasonably well to give the appropriate total chlorine loading as a function of time.

6) Convective drying is included in the model, which is now clarified.

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7) We've clarified that we meant that the model transported ozone anomalies from the stratosphere to the surface at the South Pole, and that this phenomenon has also been seen in observations.

8) We agree that the bromine discussion was too simple, and have revised this to include both similarities and differences with respect to chlorine compounds in the stratosphere.

9) We now only use A2 for brevity and simplicity. This is the commonly used 'high-end' IPCC SRES scenario that assumes roughly 'business-as-usual' with little progress in emissions controls. This was used for comparison with other published simulations, such as those discussed in the stratosphere-troposphere exchange section.

10) We've deleted the term Q-flux, and described this instead.

11) This is a good point, and we thank the reviewer for catching this. We meant to state that the change in ozone was due to increased flux of gases that affect ozone, such as water and NOx, rather than ozone directly. This has been revised.

12) Thanks again for catching a mistake. The reactions 47-49 in the list erroneously all had the same reactants due to a faulty cut-and-paste. In fact 48 should have been N+NO2 and 49 N+NO, though the products were correct. This has now been corrected, and the error was only in the listing for the table, while the model has the correct reactions. It is true that heterogeneous bromine chemistry is not yet included, and we hope to add this to the next model version.

13) We've clarified the definitions of our model-observations comparisons.

14) We've added the present-day values, as suggested.

Technical comments: All addressed as suggested.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4795, 2006.

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Interactive Comment