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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Uncertainties and assessments of chemistry-climate models of the stratosphere" *by* J. Austin et al.

J. Austin et al.

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Response to Reviewer 1:

1. Rather than investigate the annular modes in the different models, which would take considerable effort and would form a study in its own right, we have chosen to concentrate on more direct issues, such as the behaviour of the heat fluxes illustrated in Figures 4, 5 and 8, and section 3.4.

The theme of section 3.3 is described from the opening sentence: the impact of the position of the model upper boundary on the transport of constituents. In principle, the mass streamfunction is capable of clarifying these processes. However, in practice the upper boundary has had little influence on the diagnostics presented. The final paragraph of section 3.3 is largely of a discussionary nature and has been moved to the conclusion (section 5). The previous paragraph in section 3.3 discusses the

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comparison between two models which are similar (MAECHAM/CHEM and E39/C) apart from the fact that the latter model has a lower upper boundary, with appropriate upper boundary condition for constituents and additional dissipation in the top layers. The fact that the results of these two models are similar indicates that the dissipation may be more important than the position of the upper boundary for the climatological statistics considered here. While this is a null result it is no less important for that.

2. The main difference between the models here is due to the incorporation of a non-orographic gwd scheme in the MAECHAM/CHEM model. Apart from this, in the revised paper, it is now mentioned that the MAECHAM/CHEM and E39/C models have equivalent physics *and chemistry* (section 3.1).

3. A discussion of temperature biases and trends in the models near the tropopause would indeed be a useful study. Unfortunately, this would require considerable extra work and detract slightly from the high latitude focus of the paper. Clearly, without a discussion of model results at the tropopause, section 3.5 is incomplete. Therefore, in the revised paper, we have removed section 3.5, and noted that water vapour trends are a model uncertainty by placing a summary of the relevant points in the conclusion.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1035, 2002.