

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

### **Anonymous Referee #1**

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The manuscript presents a comparison of stratospheric climates produced with a suite of chemistry-climate General Circulation Models. I commend the authors for this voluminous effort. It is shown in the this manuscript that model uncertainties and biases are a critical factor when one tries to evaluate those models' simulations, or carry out a prediction of future scenarios. By contrasting different types of diagnostics, the authors conclude that uncertainties and biases in those models result primarily from the dynamical component. Differences in certain assumptions in chemical parameterizations of the stratospheric system, although relevant ultimately for future ozone predictions, are in fact less important.

I deem the manuscript publishable after some minor revisions and satisfactory reply to this reviewer's comments.

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## Queries/Comments:

1) Throughout the manuscript there seems to be a greater emphasis on the radiative feedbacks of ozone and greenhouse gases on the climate system, but not sufficient consideration of the dynamical feedbacks. For example: How do these model represent the annular mode, and how (or, whether) does it vary from model to model? On this subject, I also find the discussion of Section 3.3 of very little interest: What am I supposed to conclude from those lines in Fig. 7? I think Section 3.3 lacks some clear goal, it seems more like an after thought. That Section carries the implicit (but never mentioned) connection to the annular mode and its climatic relevance (I am assuming that, but not necessarily embracing it). The same comment applies to Section 3.4: Once more, the connection to the climate could be emphasized by a discussion of the annular mode.

2) In Section 3.1, last sentence of paragraph beginning with "Figure 3 shows model temperature...". Is the implication here that a more sophisticated chemical package has modified the model biases (i.e., MAECHAM/CHEM vrs. E39/C)?

3) Section 3 deals with model biases mostly at high latitudes. In view of the following discussion on water vapor trends, I find disappointing that the authors do not discuss temperature biases near the tropical tropopause.

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