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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Past and future conditions for polar stratospheric cloud formation simulated by the Canadian Middle Atmosphere Model" *by* P. Hitchcock et al.

P. Hitchcock et al.

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We thank the reviewer for their helpful comments and for their time and effort. Our replies to the issues raised by the reviewer follow.

Specific Comments

In section 2, I miss a short summary on the used forcings (apart from SSTs and seaice). E.g., the missing natural sources of variability are only denoted in section 6. I would expect such an information already in section 2.

Discussion has been added to section 2 regarding which sources of stratospheric variability are included in these model runs.

***p. 16559, l. 5-7**: It's not really clear to me what the differences between the three simulations are. Are they forced with different realizations of the SSTs? Please clarify.*

If different realizations of the SSTs are used, are there any differences in the SST trends which could explain the varying behavior of the three simulations shown in Figure 10? This could be added to the discussion about Figure 10 in section 5.

The runs are indeed forced with different SST realizations. This point has been clarified in the text. While it would be very interesting to attribute differences in polar stratospheric temperatures to the SSTs, it remains an open question as to how in detail SSTs impact the polar stratosphere, and is beyond the scope of this work.

***Figures 4 and 6** are too small. They need an enhancement. An enlarged y-axis would help to see the different contour lines (black and dashed lines in middle and lower panels). It is hard to see the lighter shading. It should be adequate to show only one (dark) shading, either indicating the significance at the 95There are additional very thin lines in the middle and lower panels. These lines are also very difficult to see, they should be removed or redrawn.*

*In **Figure 9c** the distribution lines overlap one another at several semi-monthly intervals. This is more confusing than helpful. Maybe it is sufficient to show only the means and error bars of each distribution (or use another scaling).*

We have enhanced Figs. 4 and 6 as suggested, and increased the size of Fig. 9c. See our response to the second reviewer for more details on changes made to the figures.

Technical Corrections

Acronyms need to be defined.

Acronyms have now been defined as further explained in our response to the second reviewer.

***p. 16558, l. 26:** 'T32' I would add the horizontal resolution expressed as degrees*

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latitude x longitude in parentheses.

The approximate horizontal resolution of the linear transform grid has been included in section 2.

***p. 16564, l. 10**: I would change "cool by nearly 10 K" to "cool by 8 K", because the 8 K drop in the monthly mean temperature in November is mentioned a few sentences before (p. 16564 l. 1).*

The text was changed to 9 K in both cases to be consistent with Fig. 4a2.

***p. 16564, l. 25-27:** The November warming is mentioned, afterwards "this cooling" is explained by radiative effects of increased carbon dioxide. This is confusing. Please change the sequence of the two sentences.*

Discussion of the spring time temperature changes has been clarified.

***p. 16568, l. 18:** The citation within the text differs from the citation in Figure 10. Rex et al. 2004 - not 2006 - should be cited (or both).*

The caption of Fig. 10 now cites Rex et al. 2006 to be consistent with the text.

***p. 16582, Figure 9c caption:** "... in at semi-monthly ..." is wrong. It has to be changed to "... in the Arctic at semi-monthly ..." or "in" has to be removed.*

The sentence has been corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16555, 2008.

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Interactive Comment