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ACPD

8, S7362–S7364, 2008

Interactive Comment

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

### Anonymous Referee #1

Received and published: 22 September 2008

## **General comments**

The paper investigates the conditions for PSC formation in an ensemble of three CMAM integrations covering the period 1950 to 2100. The development of stratospheric Antarctic and Arctic temperatures is discussed with respect to the radiative effects of carbon dioxide and ozone and with regard to changes of wave forcing. Simulated Arctic Vpsc for the past are compared to the observed Vpsc trend. Possible reasons for differences between the observed trend in the Arctic low-temperature extremes and the modeled temperature are discussed.

This paper is well written and structured. I recommend publication in ACP after minor





revisions (see following comments).

#### **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.

**p. 16559, I. 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.

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 95% level or at the 99% level. There 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).

#### **Technical corrections**

Acronyms need to be defined.

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**p. 16558, I. 26**: "T32" I would add the horizontal resolution expressed as degrees latitude x longitude in parentheses.

**p. 16564, I. 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 I. 1).

**p. 16564, I. 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.

**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).

**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.

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

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