

Interactive
Comment

***Interactive comment on* “Evaluation of the tropospheric flows to a major Southern Hemisphere stratospheric warming event using NCEP/NCAR Reanalysis data with a PSU/NCAR nudging MM5V3 model” by K. Wang**

K. Wang

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We thank the reviewer for the comments. A detailed response to each point is given below.

Motivation

The motivation for this work is to evaluate the tropospheric flows to the extraordinarily Southern Hemisphere stratospheric warming in 2002 using the novel nudging method provided by the MM5V3 model.

We will redraft the manuscript and revise the reference and discussion to Charlton et

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al. [2005] following reviewer's comments.

Since we are able to printout the PDF file following the link shown on ACPD website, it is unclear what caused the problems indicated by the reviewer.

Suitability of model for experiments

As indicated by the reviewer that we aware the 10 hPa model top used in this work. Since the aim for this work is to evaluate the flow conditions in the troposphere to the development of the 2002 Antarctic warming event (see Table 1), we focus our discussions on results from these experiments.

A study of downward propagation in the stratosphere (or mesosphere) is not the intent for this work. The concerns pointed out by the reviewer will be included in the revision.

Suitability of methodology

As shown in Table 1 and discussed in section 2.2, the analysis data were used in these experiments (page 7959, lines 21-25; see also section 3.1, page 7961, lines 21-28). Hence, the grid nudging method of the MM5V3 model was used, and the flows were constrained to all grid points. We will provide more detailed description and published references (e.g., Barna and Lamb, *Atmos. Environ.*, 34, 4889-4906, 2000; Kwon et al., *Mon. Wea. Rev.*, 2966-2974, 2002; Hogrefe et al., *Atmos. Environ.*, 35, 4159-4174, 2001) in the revision.

From a series of 288-h simulations (Table 1) we found that increase in constraints from the troposphere can increase the simulated flows more resemble to those occurred in the lower stratosphere of 20 hPa. Hence more information from the troposphere do improve the simulated results. This characteristic is consistent with a short-term 72-h forecast simulation without tropospheric constraints (Figure 2).

More modelling and analyses are needed to gain a better understanding on the processes leading to the SH2002 event. For example, we are using the nudging technique shown in this work to screen the origin of the tropospheric conditions that would be most

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significant to the development of the SH2002.

Suitability of diagnostics

Since temperature field is a striking feature for the SH2002, we use this field to evaluate our simulation results. We thank the reviewer for pointing out the use of other fields. In the revision we will make the figure larger for viewing.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 7953, 2008.

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8, S3256–S3258, 2008

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