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Interactive comment on "A 3D-CTM with detailed online PSC-microphysics: analysis of the Antarctic winter 2003 by comparison with satellite observations" *by* F. Daerden et al.

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The authors may wish to consider within their analysis of model/observation differences that during Antarctic winter 2003 high abundances of NO_y of mesospheric/lower thermospheric (MLT) origin were deposited into the polar stratospheric vortex. Funke et al. (2005) have shown from MIPAS observations that from May to August 2003 high volume mixing ratios of NO_x (up to 200 ppbv NO_x during polar night) were transported downwards from the mesosphere/lower thermosphere into the stratosphere. The net deposition of NO_x of MLT origin into the stratosphere during the 2003 Antarctic winter was assessed at 2.4 Gigamoles, making up appr. 9 % of the N_2O oxidation source in

the Southern hemisphere. Further, Stiller et al. (2005) have shown, also from MIPAS observations,that the deposition of MLT NO_x caused the formation of a second HNO_3 maximum in the upper stratosphere with volume mixing ratios up to 14 ppbv around 34 km (appr. 1000K). The second upper stratospheric HNO_3 maximum was transported downwards during Antarctic winter 2003, giving rise to elevated HNO_3 volume mixing ratios (> 5 ppbv) around 585 K and below from mid July on. The deposition of upper atmospheric NO_x in the austral polar stratospheric vortex – where it was partially converted into HNO_3 – could explain, at least by part, the differences between the model and the observations at the highest two levels of potential temperature, as shown in Fig. 6 and discussed in Section 3.5, if the model does not adequately account for the MLT NO_x source and the related downward transport process.

References:

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