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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dehydration of the stratosphere" *by* M. Schoeberl and A. Dessler

M. Schoeberl and A. Dessler

mark.schoeberl@mac.com

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Referee 1

1) The reviewer is correct that relation used to compute the saturation water vapor is not the most recent. Comparison among the seven different formulas shown in http://cires.colorado.edu/∼voemel/vp.html indicate that Marti and Mausberger is about 2% high compared to Murphy-Koop in the range of interest. This is an insignificant difference for our calculations, but we will use Murphy-Koop in the future.

[Murphy, D. M. and T. Koop, Review of the vapour pressures of ice and supercooled water for atmospheric applications, Quart. J. Royal Met. Soc, 131, 1539-1565, 2005]

2) Consideration of H2. The reviewer is correct that methane oxidation yields both water and H2 so we have slightly overestimated water in the upper part of the domain.

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We don't consider this important since we focus on the region below 30 km but we now include this caveat in the text.

3) Done. 4) Done. 5) Discussion added 6) missing data – fixed in caption

7) The dipole structure is in the temperature field as can be easily shown by looking at the minimum temperature plot as noted in the discussion of Figure 8b. Although 8b is a zonal mean plot, we have created a time mean minimum temperature plot corresponding to Fig. 8a and this plot clearly shows the WP dipole pattern. 8) More discussion of the definition of the influence function has been added.

Comment by Schiller

Thank you for pointing us to this reference – it has been included in the text.

Referee 2

(A-D,G) The referee is correct about back and forward trajectories– we have changed the paragraph. Having re-read the Liu paper, we agree with the reviewer's corrections on the results more discussion of the Liu paper is now in the text including a new Figure 2 which shows why the kinematic model produces a drier stratosphere opposite to the results from Liu. We also speculate on why this might have occurred.

(E) Our model results are not affected by changing the removal level to lower altitude. This is noted in the text.

(F) The equation in our paper was incorrect we only used inertial gravity waves assuming that MERRA would already contain the large scale waves. We have corrected this error.

(i) See comment 7 above on the dipole structure.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10159, 2011.