Atmos. Chem. Phys. Discuss., 11, C1590–C1591, 2011
www.atmos-chem-phys-discuss.net/11/C1590/2011/


Atmospheric Chemistry and Physics Discussions

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

**Anonymous Referee #1**

Received and published: 7 April 2011

This paper details a calculation used to model stratospheric water vapor using a trajectory calculation, assumptions about dehydration, and assimilated winds and temperatures. The paper is clearly written, and results in regards to spatial locations of dehydration are new. I recommend it be published, and have only made a few minor comments mainly for improving clarity.

1) "The Marti and Mausberger (1993) relation is used to calculate the saturation vapor pressure with respect to ice." Murphy-Koop (2005) is a more up to date assessment of Pice, and it included discussion of Marti/Mausberger.

2) "loss of each molecule of methane produces two molecules of H2O (e.g., Wofsy et al., 1972; Dessler et al., 1994)...see LeTexier et al. 1988 or Wrotny et al 2010 which also indicate the H2 oxidation needs to be considered in the upper stratosphere.

3) "transport scheme (K or D)." You need to define somewhere prior to this that K



means kinematic and D means diabatic (or just write them out.)

4) "We use MLS version 3 data, which is an improvement over the validated version 2 data" You need a reference for V3.3 which is what I assume you're using. A possible reference is the data description document on the Goddard DAAC, which also shows some nice validation type plots.

5) Discussion of Figure 6: The August comparison looks better than the January cmoparison. Could you add some discussion that makes a guess as to why that is? I'm assuming the NH doesn't have a well enough contained vortex possibly, and the SH has too strong mean meridional downwelling. Also, a few more numbers on the color bar axis would be helpful, as well as making them bigger for those of us with aging eyes.

6) Figure 7: What are the extra vertical black lines in the MLS plot? Note that also this seems to be your poster child for showing that the kinematic trajectories are noisy.

7) Discussion of Figure 8...re the dipole in the TWP. Do temperatures at the cold point from MERRA show the same dipole pattern (or is it related to tropopause height patterns?)

8) Figure 10: I'm confused as to what is plotted here. Is this the fraction of particles of all the ones you've run that have ended up in these regions? Just a bit more explantion in the text or the caption would be helpful.

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