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Interactive comment on “Simulation of stratospheric water vapor and trends using three reanalyses” by M. R. Schoeberl et al.

Anonymous Referee #3

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This manuscript presents results from domain-filling, forward trajectory simulations driven by three different reanalyses. The manuscript is well written. The comparison between the different reanalysis representations of tropical tropopause temperatures, stratospheric transport, and resulting stratospheric humidity structure is particularly interesting. I have several relatively minor suggestions that I would like the authors to consider.

1. Figure 7: Although there are significant similarities between the simulated water vapor patterns and the HALOE and MLS observations, the water vapor fields driven by the reanalyses do not reproduce the distinct observed dryout of the stratosphere after 2000. This is perhaps surprising since it has been shown (Randel et al., 2006, JGR) that radiosondes indicated a decrease in tropical tropopause temperature that

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corresponded well with the observed decrease in stratospheric humidity. On the other hand, the decrease in tropical tropopause temperature occurred predominantly near the cold point, and the analyses do not resolve the cold point well. Perhaps the authors could add some discussion of this issue to the manuscript.

2. The authors compare 100 hPa temperatures observed at Singapore with those in the reanalyses. For simulations of dehydration, it would be more relevant to compare the cold-point temperature. I would suggest using the data from the SPARC High Resolution Radiosonde Dataset (<http://www.sparc.sunysb.edu/html/hres.html>), which contains soundings with sufficient vertical resolution to resolve the cold point well. Several deep tropical stations are included.

3. Along the lines of comment (1) above, it is apparent from Table 3 that the trends in the models bear little resemblance to those indicated by the observations. In fact, it appears to be a real mess because the HALOE+MLS trend doesn't agree with the Boulder sonde trend, and the models using the different analyses give trends with different amplitudes and signs. Perhaps these discrepancies again highlight the poor representation of the cold-point in the analyses.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 8433, 2012.

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