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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Trajectory model simulations of ozone and carbon monoxide in the Upper Troposphere and Lower Stratosphere (UTLS)" *by* T. Wang et al.

S. Wong

Sun.Wong@jpl.nasa.gov

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This article documents the ability of the trajectory domain filling model to simulate variability in stratospheric O3 and CO. It is well written and concise. I have two major comments perhaps the authors may consider to address them in the discussion section.

1. The Production P and Loss frequency is parameterized as climatological monthly values for O3. So the interannual variability seen in the model is mainly driven by the interannual variability in the circulation, as discussed in the text and Fig. 13. When

there is interaction between circulation and chemistry, this may not be reflected in the climatological Loss frequency. For example, during stratospheric warming in late winter early spring, warmer temperature results in a warmer and looser polar vortex which is not in favor of the ozone hole depletion. The interannual variability of the depth of ozone hole caused by this reason may not be reflected in the model. The authors may consider discuss this or how to remedy such problem. Similarly, the variability in ozone hole related to QBO caused by changes in zonal-mean flow and wave interaction may also be missing in the model.

2. When comparing satellite data with model data, I am happy to see the authors apply averaging kernels to make decent comparison. However, have the comparison also done with the same sampling? For example, MLS data have quality flags. When the MLS flags a data at a location and time as bad quality so the data are not used in averaging, do you discard the corresponding location and time's data in the model? HOw may this sampling issue influence your results?

A minor comment is on Fig. 2. It is known that the maximum O3 production is at around the tropical 30 hPa (may migrate with season.) The plot (P-L)/L here shows the maximum net production is at the tropopause level instead of 10 hPa. Is that because the loss of ozone is also big at 30 hPa, or is that because the effect of dividing by L so that the peak becomes at a lower altitude?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 5991, 2014.