Atmos. Chem. Phys. Discuss., 15, C72–C73, 2015
www.atmos-chem-phys-discuss.net/15/C72/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The decrease in mid-stratospheric tropical ozone since 1991" *by* G. E. Nedoluha et al.

Anonymous Referee #1

Received and published: 2 February 2015

After reading through the manuscript, I fully agree with Referee 3's assessment. Publication is recommended in ACP after minor changes. Here are a few comments for the authors to consider in their revision:

(1) In the Introduction on p. 455 (lines 22-26), it is noted that Portmann et al. (2012) showed that an increase in N2O emission at the surface would lead to a global mean decrease in ozone in the 30-35 km region. This seems to be inconsistent with the mechanisms discussed in the rest of the paper. For example, in the next sentence it is noted that Plummer et al. find that an increase in global N2O at 10 hPa leads to an ozone increase there. So, please provide an explanation here or later in the paper.

(2) P. 456, lines 23-27. Here some key results of the analysis are stated in the Intro-

duction. Normally, it is better to state only what will be done and why in the Introduction and save the results for later. Probably the purpose is to motivate the reader to read the full paper, but this can usually be done without giving away the results. Just an optional suggestion.

(3) P. 458, line 20. “Lasp”?

(4) P. 464, line 20. “doubled to 1 km”? Does this mean that the resolution was 0.5 km and was changed to 1 km? Please make this clear.

(5) P. 464-466, Model calculations and summary. Use of the CHEM2D model, as done in this manuscript, is a logical first step toward understanding the dynamical and chemical processes that apparently lead to the observed negative O3 trends in the tropical middle stratosphere over the 1991-2014 period. However, to verify these results and investigate other aspects of ozone trends (such as the ozone increase in the SH mid-stratosphere seen by MLS), 3D models with interactive chemistry and coupled oceans are probably needed. A suggestion for future work is to consider analyzing CMIP-5 model results (Taylor et al., BAMS, v. 93, p. 485, 2012). A number of the CMIP-5 models included interactive ozone chemistry and coupled oceans. The historical simulations were intended to account for known anthropogenic and natural forcings and extended from the mid-1800’s to 2005, which overlaps significantly with the period studied in this manuscript. The model data are archived so it is straightforward to analyze the data and investigate whether the SH positive O3 trend, for example, is simulated by any of these models.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 453, 2015.