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Atmospheric Measurement Techniques Discussions

Interactive comment on "Tropical tropospheric ozone column retrieval for GOME-2" *by* P. Valks et al.

Anonymous Referee #1

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Review: "Tropical tropospheric ozone column retrieval for GOME-2" by Valks et al.

This study is a follow-up to Valks et al. [2003] that incorporated GOME measurements to derive tropospheric ozone using a CCD method. The current paper is not just a repeat of this earlier paper, but instead demonstrates an improved dataset (GOME-2) and evaluates the EMAC model along with measuring NO2 in the tropics. A new result from this study is an evaluation of the EMAC model with ENSO. The test using the Ozone ENSO Index demonstrates that the model is performing well in relation to SST/ozone variability with ENSO events. The paper is well written and is suitable for AMT. I have just a few mostly minor comments for the authors to consider:

Section 4.2, line 15: The very low to near-zero ozone measured by GOME-2 is an

important science result that is not really commented much about in the paper. Kley et al. [1996; Science] shows measurements of near-zero ozone in the tropical Pacific mid-upper troposphere associated with deep convective clouds. However, a later paper by Vomel and Diaz [2010; Atmos. Meas. Tech., 495-] attributed the near-zero ozone measured by the sondes as an artifact. Both OMI [Ziemke et al., 2009a] and now GOME-2 independently measure very low to near-zero ozone concentrations in these tropical regions implying that such exceedingly low concentrations are likely not just artifacts of the satellite and sonde measurements.

The authors might mention that mean concentrations of 4-7 ppbv in Figure 4 represent average column abundance of at most about 1 Dobson Unit (based on a 300 hPa mean cloud pressure). Hence, the above-cloud amount in these regions is essentially identical to stratospheric column ozone. This further corroborates from independent GOME-2 measurements the basic hypothesis of Ziemke et al. [1998, 2009a] for deriving stratospheric column ozone in the Pacific from deep convective clouds. It seems that most of the 4-7 ppbv ozone concentrations in Figure 4 originate from the upper levels above about 250 hPa and with essentially near-zero ozone below 250 hPa.

Figure 7: It would be useful in Figure 7 to embed mean differences (GOME2 minus sonde, EMAC minus sonde) and standard deviation of the differences with the sondes. Correlation might also be included. Perhaps because this figure is quite congested another Table could be constructed for the statistics rather than being embedded in the figure.

The other reviewer(s) may agree with me that the figure labeling is very small and difficult to read. For most of the figures the print out of the PDF file has labeling text that is not readable. Only magnifying the PDF file to about 300% on screen can text be read – this is especially true for Figure 4 and Figure 7 in which the text is very faint as well. The authors might wish to enlarge the text labeling in the figures.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 727, 2014.