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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Development of a climate record of tropospheric and stratospheric ozone from satellite remote sensing: evidence of an early recovery of global stratospheric ozone" *by* J. R. Ziemke and S. Chandra

Anonymous Referee #2

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The authors first evaluated the convective-cloud differential (CCD) method with Aura OMI ozone measurements. Tropospheric and stratospheric column ozone data using the CCD method are compared with the Aura OMI/MLS residual measurements. The authors showed the two datasets are within a few Dobson Units in the Pacific as well as the zonal means from the tropics to high latitudes. The authors then extended the CCD method to earlier UV instruments and developed a 32-year long dataset of tropospheric and stratospheric column ozone. Quasi-Biennial Oscillation (QBO) signals in tropospheric column ozone and trends in stratospheric column ozone were examined

with this long time record. Overall, the study is well conducted and written. The 32-year long dataset of column ozone measurements from satellite instruments provides valuable information to assess the ozone trends. I recommend publish on ACP after addressing the following minor comments.

Specific comments:

1. Page 3178, Line 3: Suggest delete "unrelated". It is not clear to me what it relates to.

2. Page 3179, Line 2-3: In Figure 4, there are persistent negative values of cloud ozone over the northern Pacific except in summer. Is it a possible factor that MLS SCO are biased high?

3. Page 3180, Line 5-13: I do not understand why the authors compare OCCP cloud pressures with IR cloud-top pressures here. Would it be more direct to compare OCCP cloud pressures with tropopause pressures? In that way, we may have some hints whether the large positive cloud ozone values in the extra-tropics are associated with large differences between OCCP cloud pressures and tropopause.

4. Page 3181, Line 13-15: Please describe the implications of these large cloud ozone over the extra-tropical regions. Does it reflect that TCO data using the CCD method over these regions can be underestimated by up to 50%?

5. Page 3182, Line 24: The word "shown" is redundant.

6. Page 3184, Line 11-12: Should the offsets in TCO be the same as the offsets in SCO shown in Fig. 10, because the two methods use the same OMI total column ozone measurements?

7. Page 3184, Figure 13: Can you please explain why the RMS values for zonal means are smaller than those for the Pacific means where the CCD method are robust? Does it reflect there are compensating errors when averaging zonally or reflect effects from deseasonalization?

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8. Page 3186, Line 27-28: Please explain the underlying physical process that causes the negative correlation between zonal winds and tropospheric column ozone.

9. Page 3188, Line 26-29: In Figure 16, are the column ozone averaged over the Pacific or all longitude range between 60S and 60N? Are the SCO data record with the CCD method only averaged over the Pacific?

10. Page 3190, Line 6-12: I also suggest point out other possible factors contributing to the observed recovery of stratospheric ozone layer in addition to the Montreal Protocol, such as changes in transport and temperature. A review is given by Weatherhead, E. C., Andersen, S. B.: The search for signs of recovery of stratospheric ozone layer, Nature, 441, 39-45, 2006.

11. Page 3199, Fig. 4: Suggest add a color bar. The contour values are difficult to read.

12. Figure 3204, Fig 9: Please describe in the caption the contour values and increment.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 3169, 2012.