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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A study on harmonizing total ozone assimilation with multiple sensors" *by* Yves J. Rochon et al.

Anonymous Referee #1

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This is a VERY detailed technical report on data assimilation techniques used to harmonize multiple total ozone data sources to minimize biases. The reasons stated for this effort is for the generation of trends over a long period of time (and multiple total ozone sources), for generating good ozone forecasts, and generating good UV Index forecasts. My first comment is that ACP is NOT the place for such an article but rather a more DA oriented journal like AMT or Journal of Applied Meteorology and Climatology. There is too much detail provided in the early sections of this paper. The descriptions of the assimilation system, satellites, and surface observations can be greatly reduced as should the rest of Section 2.

I accept the reasons given for assimilating data from multiple sources on page 9. But for operational weather forecasting practicality, it is better to use one total ozone source

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Discussion paper

and monitor the other sources. For a reanalysis effort this also applies, but the bias correction for long term trend (or consistency) plays a more important role.

It appears to me that more time and effort should be spent on improving the Production and Loss terms to improve the ozone forecasts and maybe rethinking the climatology. The CNTL run shows how badly the total and profile forecasts become over a short period of time. Assimilating OMI or additional ozone sources will improve the analysis but have little effect on the forecasts. Improving the forecasts will also decrease the O-F in the tropics where one would expect them to be small.

One of the purposes of this effort is to improve the UV Index forecasts. Clear sky UV Index values are generally determined from total column ozone and solar zenith angle. Percentage errors in the total column ozone reflect nearly an equal (opposite sign) error in the UV Index. So a +/- 2 percent error in total column ozone generates the same amount of error in the UV Index. That is highly acceptable, especially when adding the much larger range of errors due to clouds and aerosols.

From the results of additionally assimilating ozone profile information either from the MLS or OMPS-NP, I would hope EEEC considers doing so operationally to improve the ozone profile. This is important radiatively as the ozone profile plays an important role in the temperatures in the stratosphere. This also could improve the ozone forecasts in the high latitudes, especially within ozone depleted regions.

The usage of the OMPS-NM and OMPS-NP versions prior to their “final” version 8 product is unfortunate, but I gather was the only choice for this study. Many of the OMI-OMPS differences will be ameliorated in the version 8. I hope this is made crystal clear in the article so that readers will not get the wrong impression of the quality of the OMPS products in version 8 form.

The graphics are quite good. One comment is that a solid or dashed line at any 0 (zero) point should be shown as a reference. Another comment is that other color choices for Figure 7 should be considered. Or the graphs be separated showing the GOME

results on one and the OMPS & SBUV/2 on the other.

I don't think the "ozone effective temperature" is defined or explained such that the user knows where in the vertical or what layer this "temperature" represents.

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