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Interactive comment on "Trend Quality Ozone from NPP OMPS: the Version 2 Processing" *by* Richard McPeters et al.

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"Soft calibration techniques are applied as a function of the cross-track to improve the measured reflectivity. Please mention if this is part of the new L1 version or if this soft-calibration step is applied as part of the ozone retrievals. Could you add figures showing the soft-calibration factors and also the impact on total ozone as a function of the row?"

The cross track corrections are applied as N value corrections in the algorithm. The corrections are needed for all wavelengths, not just the reflectivity wavelengths, so a wavelength dependent correction is applied. This is an important correction, but I feel that plots showing this would be overkill for a validation paper.

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[Discussion paper]

"Generally, the comparisons are carried out using data until end of 2016. Please extend the time series up to now. This is especially important for drift analysis."

The comparisons for the version 2 data have been extended through 2017. (See Figures 4, 5,8,10, and 11) Version 1 data were only processed through the end of 2016.

"Validation of total ozone columns from the nadir mapper (figure 3): There are systematic differences between Brewer and Dobson observations. I don't think it is appropriate to mix together those two networks for validating satellite data. Could you redo Figure 3 for each type of ground-based instrument separately?"

There have been many papers comparing Dobson and Brewer, and while there are some differences, we feel that there is a statistical advantage in using the aggregated data. As Balis et al and Van Roozendael et al. have noted, Brewer and Dobson "can agree within 1% when major sources of discrepancy are accounted for."

"Figure 6: Please mention what is the upper SZA limit for which retrievals are performed. A similar plot for the ozone hole season would be welcome."

The NM retrievals go up to 84 degrees SZA (results are flagged between 84 and 88). The profile algorithm has increased sensitivity to upper stratospheric ozone at high solar zenith angles so profiles are retrieved up tp 88 degrees. The same plot for September is not significantly different except that both NM and NP have a +1% offset at 70S, near the edge of the ozone hole. I don't think it adds much.

"For the profile comparisons, as it is stated, the vertical resolution of the NP retrievals is quite coarse, making a direct comparison with sondes or limb profiles not necessarily straightforward. Did you apply averaging kernels to do the comparisons? Could you give more details on how this has been dealt with."

For some purposes such as comparison of relative sensitivity for measuring the QBO, it is essential to apply the SBUV averaging kernel to the higher resolution data set (MLS in our recent study). This not an issue for NP vs NOAA 19 SBUV/2 of course since

they have the same resolution. The comparison with MLS shown in Figure 9 is a broad average (40S to 40N) and a 5 year average of June data. The MLS comparison actually shows less vertical structure than the N19 comparison. Using averaging kernels would make very little difference here.

"Lines 245-247: In which conditions are the longer wavelengths from the NM used? Is it at higher SZA/latitudes only? In that case, the low bias cannot be explained by the use of those wavelengths? Could you clarify this please?"

The longest wavelength used varies from 302 nm at small solar zenith angles (SZAs) to 317.5 nm at large SZAs. This was done to minimize the effect of smoke and mineral dust aerosols that have very high absorption in the UV. You are correct that this would have little effect on the bias so the text has been changed to reflect this. As we have studied this issue since the first draft of this paper was written, the use of the NM wavelengths in the NP retrieval looks less likely to be the source of the inconsistency.

"Figures 10/11: it seems that there is a drift in the upper stratosphere, which should be mentioned even its amplitude is not that large."

You are correct, and the drift is even more clear when the data are extended through the end of 2017. As stated in the paper, we suspect that the drift is mostly due to the aging N19 instrument.

"Tropospheric Ozone: Can tropospheric columns be derived by combining the NM and NP retrievals (instead of using the LP product)? How would such columns compare with the presented product? Or are there good reasons to prefer using LP measurements to remove the stratospheric part? Is it possible to add a comparison with integrated tropospheric columns from sondes?"

No, combining NM and NP does not add information on the troposphere. NP simply does not have the vertical resolution that would be needed. In principle the total ozone from NP should be more accurate than that from NM, but one of the conclusions of this

paper is that there are calibration issues with the NP that we are trying to resolve. The value of using stratospheric ozone from LP is that the measure of stratospheric ozone is much more accurate than that from NP.

Corrections were made based on the minor comments.