Review

Title: An Approach to Track Instrument Calibration and Produce Consistent Products with the Version-8 Total Column Ozone Algorithm (V8TOZ)

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This paper describes an approach for radiometric adjustments of UV channels (between 310 – 380 nm) to achieve product consistency among viewing angles, demonstrate that the broad-band retrieval improves product quality over that of narrow-band retrieval. Papers that describe soft-calibration method are rarely published or submitted, but much needed. The broad-vs-narrow band finding is significant. Hence, I recommend publication of this paper, after addressing items listed below.

General comments

This soft-calibration method improves the radiometric calibration of the OMPS instruments on SNPP and NOAA-20 satellites. However, this approach uses a soft-calibrated product (i.e., NASA's NMTO3-L2) as a reference. Therefore, its success depends on the success of a different soft-calibration method. Why develop a new one and not adopt the NASA method? How to ensure consistency over time from years to decades?

Specific comments

1. Line 55: 'homogeneous' is not the right word to describe SDR.

2. Line 74: replace 'statistical' with algorithmic.

3. Line 74-75: 'The science basis and statistical procedures as well as error sources for the V8 algorithm have been well documented in the OMPS ATBD and other articles (Bhartia & Wellemeyer, 2002; McPeters et al., 1996).'

   Many O_3 errors depend on instrument characteristics, therefore error analyses need to be performed for each instrument (or each slit function).

4. Line 78: 'measurement departure', not clear in the context.

5. Line 79: 'Researchers interested in error analysis and refined retrievals could take it as reference.' Explain.

6. Line 88-90: 'The first assumption is that the BUV radiances at wavelengths greater than 310 nm are primarily a function of total ozone amount, with only a weak dependence on ozone profile shapes that can be accounted for by using a set of climatological profiles.'

   This is NOT a good assumption for high (viewing and/or solar) zenith angles.

7. Line 90-92: 'The second assumption is that a relatively simple radiative transfer model that treats clouds, aerosols, and surfaces as Lambertian reflectors can account for most of the spectral dependence of BUV radiation.'

Lambertian representation of surface and atmospheric particles (i.e., clouds and/or aerosols) works because radiative transfer through this simplified model atmosphere-surface system closely simulate those in the actual atmosphere, especially in the stratosphere, where most O_3 absorption happens (see Huang and Yang, doi: 10.5194/amt-15-5877-2022).

8. 'Account for most of the spectral dependence of BUV radiation' is a manifestation of the success of this simplified model, not an assumption.

9. Lines 129 – 130: 'The slit functions provide key information for the spectra convolved values of the ozone absorption cross-sections'.

   This statement seems to imply an incorrect construction or usage of look-up tables (LUTs). The correct LUT approach: 1) high-spectral resolution LUTs are constructed from radiative transfer calculations, 2) solar-weighted slit convolution of terms of Eq. 1 to create instrument (slit-function) specific LUTs. In these steps, slit-convolved cross-sections are not used.

10. Line 250: 'should keep the same value for 35 cross-track positions.' This description is not clear. Need revision.

11. Section 5, Comparison with other products

    There is another EPIC total O_3 product, which provides high-accuracy O_3 retrievals (based on the publication, Huang and Yang, doi:10.5194/amt-15-5877-2022). It is expected to have a higher correlation and lower spread between this EPIC product and the OMPS products from SNPP and NOAA-20. Please include this product in the inter-comparisons.