

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2021-430

Anonymous Referee #2

Referee comment on "Ozone Monitoring Instrument (OMI) collection 4: establishing a 17-year-long series of detrended level-1b data" by Quintus Kleipool et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-430-RC2>, 2022

This is a good paper presenting a clear overview on the OMI L1b collection 4 data. I recommend publication, after some minor corrections.

Page 4:

"This updated OMI processor has in-orbit calibration functionality in forward mode, making the TMCF system obsolete. The available TMCF calibration data has been analyzed, such that historic trends in the instrument calibration status can be corrected for in the collection 4 L01b (re-)processing."

Page 6:

"The instrument operation schedule has been updated such that calculation and calibration needed for background correction and random telegraph signal detection can now be done by the collection 4 L01b processor in forward mode without the need for the TMCF system."

Page 6:

"The design of the collection 4 L01b makes it possible to have dependencies between measurements and perform aggregate calculations."

Page 6:

"This allows, for example, to initially process background measurements, and use an aggregate of these processed background measurements in the background correction during the processing of the remaining measurements."

We assume that this processing approach is applied to one orbit only, but this is not clear from the text.

Is it possible to also apply this approach to multiple orbits, or to measurements / results from several days / weeks / months?

Page 6:

"Another improvement is that the tables allow a more fine-grained processing configuration."

It is unclear from the text if this refers to measurement class (as indicated), or to ICID (Instrument Configuration Identifier).

Page 9:

"For collection 4 L2 processing an alternative irradiance product is generated that consists of the running average over 100 daily irradiance measurements, yielding an improvement of the signal-to-noise ratio with a factor of 10."

This requires a memory capability in the processing system. How is this implemented?

Section 4.6 RTS:

In collection 3 the RTS map is based on analysing 30 days of dark signal data.

In collection 4 one day of data is used.

It looks like collection 3 is more looking more RTS in general, whereas collection 4 is more looking for RTS that is considered relevant for the L1b accuracy.

It would be interesting to know and understand more about the differences between these 2 methods.

Section 5.1:

"A small change however is that in collection 3 the sensitivity calibration, as used by the L01b data processor, was provided as a function of wavelength in the calibration key data. For collection 4 the TROPOMI convention was used, and the calibration key data was converted to be a function of detector pixel."

How do you deal with wavelength shifts for collection 4?

Figure 4:

- The caption refers to top and bottom panels instead of left and right panels.
- "Clearly there is an overall 4% degradation with no strong wavelength dependence [ALU1]"

This is surprising and seems to point to a non-optical origin, such as perhaps geometric or electronic effects. Please elaborate a bit more on the origin of this observed 4% wavelength-independent degradation.

Section 5.3 Relative irradiance:

It would be interesting to know more about the final accuracy differences between collections 3 and 4.

Section 5.4, Figure 7:

- The caption refers to upper and lower panels instead of left and right panels.

Section 5.4:

"This suggests that 2% – 3% of the observed change is independent of wavelength and not a result of optical degradation.

Also it is evident that the degradation can be strongly row dependent, especially for the UV1 channel."

What is the expected cause of this 2-3% offset? Does it make sense to include this in the irradiance degradation correction, when the cause is not optical?

What is the expected cause of this row dependency?

Figure 14:

The indicated wavelength shift is 140 pm over 40K. Please indicate how much this is in spectral pixel size (e.g. 0.13 spectral px).

Figure 15:

The indicated wavelength shift is 60 pm over a Q-factor range of 1.2. Please indicate how much this is in spectral pixel size (e.g. 0.06 spectral px).