Review comment amt-2021-430-RC2

Reviewer: Anonymous Referee #2

Dear referee,
Thank you for your detailed review of our article. Our responses to your remarks, questions and considerations can be found in the tables below. The responses also include the planned actions for the revised manuscript.

Response

Item	Referee comment	Author's response
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."	See below
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 been done by the collection 4 L01b processor in forward mode without the need for the TMCF system." "The design of the collection 4 L01b makes it possible to have dependencies between measurements and perform aggregate calculations." "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?	We will clarify this point, For the background correction the previous 24h of background data is aggregated.
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).	We will clarify this point.

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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?	The irradiance averager is a separate post-processor. We will make this clearer in the text.
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.	That is correct, with a background correction based on daily measurements, changes in RTS on a long time scale are already accounted for. Therefore only RTS behaviour which is faster than the updates for the background correction are flagged. We will add more explanation to the text.
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?	Will add a cross reference to the wavelength annotation in Section 6.2, there also corrections for shifts are explained.
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.	We will correct the caption. We will elaborate more on possible causes (see also below).
Section 5.3	Relative irradiance : It would be interesting to know more about the final accuracy differences between collections 3 and 4.	The relative irradiance is a multi-dimensional problem, so it is not straight forward to compare. We will give an indication of the changes.
Section 5.4, Figure 7	The caption refers to upper and lower panels instead of left and right panels.	We will correct the caption.
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."	We will discuss the possibilities for different types of instrument change to explain the observations. However, we lack the necessary information to pin down the exact cause of the wavelength-independent changes.

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	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).	Agreed
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).	Agreed