Review comment amt-2021-430-RC1

Reviewer: Anonymous Referee #1

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 to specific comments

Item	Referee comment	Author's response
Page 1/ line 6	'… until the eventual end of the mission.' Is this to be understood including possible extension even beyond 2023? In line 3 you mention: 'for many years more.' Suggestion to be more specific and possibly state the limitation on the extension of a mission, which is most likely here also the case due to remaining necessary fuel for deorbiting. Later you mention this on page 4/ line 91,92.	Agreed, we will be more specific
Line 8,9	In combination with the title, is the assumption correct, that data of the past 17 years is planned to be reprocessed? Maybe worth mentioning in the abstract already, if reprocessing is planned/ done. Later in the conclusions page 38/line 814 it is mentioned: 'the reprocessing of the entire 17 year mission up until now is in progress'.	Agreed
Line 17, 18	Is the understanding in combination with the statement in line 3 correct, that TES and HIRDLS are not operated anymore? Suggestion to state more explicitly the current status of TES and HIRDLS.	Agreed, we will add more information. TES was decommissioned 32/01/2018 and HIRDLS stopped working 17 March 2008.
Line 17, 18	'..instrumental effects that are common' suggestion to state the main differences between the optical paths between sun and Earth port, e.g. diffuser.	Agreed
Line 48, 49	'For collection 4 the TROPOMI naming convention was adopted, referring to the UV1, UV2 and VIS channels as band 1, band 2 and band 3 respectively.' Can you add an explanation why this has been adopted?	Agreed, will change the text to clarify why the terminology was chosen.

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Page 3/ line 54, 59	Suggestion to add references for collection 1 and collection 2 dataset, e.g. Oord, 2006 SPIE and Oord, 2006, IEEE, vol 44, no 5, see also page 6/ line 154 where one of the references is provided, but here for collection 3, which was earlier referenced to Dobber, 2008.	Agreed, we can give more details/references on earlier collections
Page 4/ line 114, 115	you mention completely understandably, that the updates of the KNMI and NASA L2 processors fall outside the scope of this paper, but could you possibly add some references?	There are no publications yet for the updated L2 OMI processors.
Page 5/ line 132	To get a better understanding what 70 000 orbits mean in time, could you add in the introduction to OMI, how many orbits per day OMI performs, e .g. around page 2, paragraph starting at line 30?	Agreed
Page 9/ line 240 / section 3.5	Might it be, that an angular dependence correction is nonoptimal leading to this 'striping'? Is a seasonal effect observed? Suggestion to also add a figure to illustrate this observed effect.	We will add a suitable reference to the striping. The subject is rather intricate and we would not be able to do it justice in a sentence or a single plot.
Page 15, 16/ section 5.2	It may be worthwhile stating, that even if the QVD degraded more than the ALU diffusers, the degradation shown over those 12 years (table 4), 16 years page 17 (figure 4) is very low compared to other instruments, especially considering its daily use.	Agreed
	Generally not for all described changes to the processor from collection 3 to collection 4 the improvements are described/ shown by absolute, error bar reductions or end-product improvement. Here some examples: Suggestion to amend graphs and/or values of significant improvements, where missing.	Not all improvements can be directly compared with collection 3, we will add more information wherever possible.
Section 6.2	'Furthermore, this over-fitting can result in unexpected behavior for extreme values of other input variables like the OPB temperature as well.' but no numbers provided and improvement not clear;	We will rephrase this to make the improvements clearer.
Section 6.1	what is the advantage of the difference implemented in collection 4?	The wavelength calibration is now reduced to the annotation which is used by L2. Will clarify this point in the text.
Section 6.2.1	improvement of changing the method on end-product not clear;	We will clarify the benefits of the pixel map in the text.

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Section 6.2.3	Improvement not clear	We will clarify the improvements.
Section 6.3	other method described, but improvement not clear;	The calculation is not performed with every processor run but implemented as calibration key data. This makes the processor more efficient. We will clarify this point.
Section 6.4	'resulted in a large amount of ground pixels that were flagged unnecessarily' without giving e.g. percentage improvement;	We will give an estimate on the improvement. Note that the improvement depends on the shape of the specific solar eclipse and up to 90% of the pixels were flagged unnecessarily.
Section 6.5	transient signal flagging	We will add examples on the occurrence of transient flags.
Page 35/ line 774	'bias is expected due to the Earth-Sun distance normalization that is present in collection 4 and not in collection 3.' If understood correctly a bias is introduced by the different method in collection 4. And, the bias is basically the improvement implemented by the new correction, but not shown in comparison with the former data from collection 3. Previously on page 8/ line 213 it is only stated that now both radiance and irradiance are corrected for Earth-Sun distance. Please consider to make the text more explicit. And please describe the value of the bias which is understood as the improvement in collection 4.	This part is not phrased very clearly, we will improve this. The collection 4 now includes a correction for Earth-Sun distance. When comparing to collection 3 this step needs to be removed to allow for an unbiased comparison.
Line 776, 777	Is the mentioned 'aggressive flagging' linked to page 12/ line 310 section 4.5 Detector pixel quality flags? If yes, suggestion to add reference to that section here.	Thank you, we will add the reference to the section.
Page 39/ line 821	'that the observed Earth reflectance is not affected by instrumental artifacts' might this be a too strong argument, since also the text describes there remain some effects, which are not able to be identified in flight, e.g. folding mirror, telescope mirror? Suggestion to change the wording slightly, e.g. is 'not significantly affected'.	We will change the wording.

Response to technical corrections

Item	Referee comment	Author's response
Page 3/ line 67	trend and calibration monitoring system (TMCF)' is it TCMF or trend monitoring and calibration system?	The latter is correct, we will change the text accordingly.
Page 9/ line 237	CKD file, please provide abbreviated text.	Agreed
Page 15/ line 394, 395	QVD, quasi volume diffuser ALU1 and ALU2 diffusers made from aluminium.	Agreed
Page 16/ line 403	'ratio From' à ratio. From	Agreed
Page 36/ figure 21	suggestion for visualization to use the same y-scale for the ratios from 1.00 to 1.40 as for the UV1 for all channels and to use dots instead of lines for better visibility and comparison.	We will improve the plot.
Figure position	The figures positioning sometimes interrupts a sentence of the text, or , e.g. page 34/ figure 19 are placed in the next section. Consider repositioning the figures closest to their description in the text.	This is partly an effect of the latex template and the used manuscript style. We will try to improve the positioning.
Last but not least	Maybe it would be nice to refer also to one of the early OMI papers by its optical designer Huib Visser, e.g. Smorenburg, C., H. Visser, and K. Moddemeijer, "OMI-EOS: Wide field imaging spectrometer for ozone monitoring", Europto/SPIE conference, Berlin, 1999, SPIE volume 3737, 1999 and/or Piet Stammes, Pieternel F. Levelt, Johan de Vries, Huib Visser, Bob Kruizinga, Kees Smorenburg, Gilbert W. Leppelmeier, and Ernest Hilsenrath "Scientific requirements and optical design of the ozone monitoring instrument on EOS-CHEM", Proc. SPIE 3750, Earth Observing Systems IV, (24 September 1999); https://doi.org/10.1117/12.363517.	Agreed, will add the latter.