A 16-year global climate data record of total column water vapour generated from OMI observations in the visible blue spectral range

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1. General Comments

This paper assesses a long term record (2005-2020) of monthly mean total column water vapour (TCWV) from the Ozone Monitoring Instrument (OMI) on board NASAs Aura platform. The authors describe adaptations to an existing algorithm used for ESAs TROPOMI instrument, which is seen as a successor to OMI. This includes the rational for the how and why they switch to using earth shine spectra as the reference in the DOAS retrieval setup. This study goes on to present results from an inter-comparison of TCWV against two addition remote sensing products from RSS and ESA and ERA5 reanalysis.

While this study does discuss issues to do with sampling, I feel this could be expanded especially relating to the clear-sky bias. Work on this has been done within the ESA water vapour CCI project, results from which are relevant to this study and would enhance the discussion around the OMI product performance. Furthermore, there is no mention regarding the quality of the datasets chosen for the inter-comparison exercise. Addition of this information at the beginning of section 3 would help inform a reader unfamiliar with these data sets to why they were used by this study. Finally, what is not clear is to whether this new data record from OMI is meant to complimentary to the existing TROPOMI data set? By this, I mean could the records be used sequentially to bring the time series out the end of the TROPOMI mission? I this is the case, how does the performance of these two record compare?

Overall, I find that this study is of scientific value and recommend it for publication, after all the issues that I have highlighted are addressed.

2. Specific Comments

- Section 3: I think the term validation here is incorrect as you are performing inter-comparison of the OMI performance against other gridded products at monthly time scales. For this to be a validation study you would need to perform this on the level 2 swath data against ground truth sites. Alternatively, accurate (fiducial) characterisation of these reference products on monthly time scales would need to be done, and this would be a major undertaking in itself.
- Lines 157-158: What is the assumption you base the relative error estimates on? From the literature, or results not included in this paper? Are you actually describing uncertainties or do you mean errors? Further elaboration here would make this clearer to the reader.
- Section 3.2: For the ERA5 did you take the hourly data and interpolate to the local over pass time **or** the monthly mean data on hourly time steps? Slight rewording to clarify is needed. Additionally, did you consider using the ensemble output which would have given the spread in the reanalysis rather than assigning a relative estimate of the uncertainty?
- Figure 7/B3: The comparison to ESA CCI over land – did you also apply stricter cloud filtering to the OMI data as well as the common mask? The improvement in representativeness can be seen in figure B3 but there could still be additional cloud in the OMI data which is biasing

the data. The common mask from the ESA data will be for 10:00 hrs LST, while with OMI overpasses at 13:30 hrs LST which will have an impact in convective areas. Finally, is there an improvement in the Hovmöller time series when the common mas is applied?

3. Technical Comments

- Line 38: the reference Susskind et al. 2003 is for joint microwave and infrared retrievals from AIRS. Therefore, is not an explicit reference for IR water vapour retrievals. There is also an extra ')' on line 39 after the reference, did you mean to have the 2003 in-cased in parenthesises?
- Line 39: both your references here are for near infrared retrievals from MERIS, missing a shortwave infrared reference e.g. SCIAMACHY (2.3 µm), GOSAT (1.6 +2.1 µm), or TROPOMI (2.3 µm).