

Dear Dr. Lang,

Thank you very much for your review.

We did the comparison with the Aqua MODIS water vapor mainly because of its local time proximity to the OMI water vapor. As you point out, the MODIS product has limitations over the ocean. In the revised paper, we have concentrated on the comparison over the land for MODIS.

We have also received similar comments from Dr. Lindstrot. Following Dr. Lindstrot's recommendation, we have added a comparison with the GlobVapour MERIS+SSM/I gridded product. Although the GlobVapour product is for the morning (while OMI is for the afternoon), it combines near IR data from MERIS over the land and microwave data from SSM/I over the ocean.

The validation presented in this paper is our initial effort. It helps us build confidence that our retrieval is producing meaningful results. Extensive validation is currently underway and will be topic of a future paper. To clarify our intention, we have changed the first paragraph of Section 4 to the following "In this section, we present our initial data validation results. A comprehensive data validation will be performed later. In this paper, we compare our VCDs with the MODIS near-IR data, the GlobVapour combined MERIS+SSM/I data and the AERONET ground-based measurements."

We agree that AMFs can introduce significant bias in VCDs. We have examined the sensitivity of AMF to wavelength, solar zenith angle, surface albedo and cloud height in Figure 7 and added the corresponding discussions in Section 3.2 of the revised paper. Since the cloud product OMCLDO2 does not consider aerosols, to keep consistency, we did not consider aerosols in our radiative transfer calculation, either. We would like to defer the investigation of the effect of aerosols to future work.

Please find our reply to each specific comment below.

1) [p. 545, l.23: Aliwell reference is missing in the reference section](#)

We have added the following to the the reference list of the revised paper:

"Aliwell, S.R., Van Roozendaal, M., Johnston, P.V., Richter, A., Wagner, T., Ariander, D.W., Burrows, J.P., Fish, D.J., Jones, R.L., Tornkvist, K.K., Lambert, J.C., Pfeilsticker, K. and Pundt, I.: Analysis for BrO in zenith-sky spectra: An intercomparison exercise for analysis improvement, JGR-Atmospheres, 107, D14, Art. No. 4199, doi:10.1029/2001JD000329, 2002."

2) [Section 2.2.2 on the retrieval setting sensitivity: I think there is a conclusion missing from this section on why the "standard" settings are used in the end as the standard. For example. why is Rothman et al 2013 not used even though the number of negatives are reduced with respect to the standard. Is the standard set with respect to the best performance in the validation results? This should be stated \(or referred to\) in this section.](#)

We now point out in Section 2.2.2 that "the standard window leads to the smallest uncertainty". We have revised the text in Section 2.2.1 so that it reads "We uses a spectral window from 430 nm to 480 nm for our standard water vapor retrieval as it leads to the smallest retrieval uncertainty (Section 2.2.2)."

We obtained the HITRAN 2012 (Rothman et al., 2013) water vapor spectrum after we developed the standard retrieval. Since switching to the new reference spectrum leads to a change in median SCD (6%) that is smaller than the median retrieval uncertainty (11%), we decide not to change the standard retrieval. The same applies to the oxygen collision complex spectrum. We have added the following sentence to the last paragraph of Section 2 - "After getting new reference spectra for water vapor and oxygen collision complex, we have tested the sensitivity of our standard retrieval with respect to them."

- 3) Section 4. I think the overpass time of Aura (with respect to Aqua) is missing here or in the introductions to OMI.

In the second paragraph of Section 4, we have added "Aqua is about 15 minutes ahead of OMI's host satellite Aura in the "A-Train" constellation."

- 4) Page 10, l.10f: "For Mauna Loa (Fig.7g) the large difference is partly related to AERONET measurements being on the mountain." This seems an understatement. The differences are probably in toto related to the fact that the Aeronet station is at 4000 m.

We have deleted the panels in the bottom row of this Figure.