Interactive Comment on "Water vapor retrieval from OMI visible spectra"

H. Wang[1], X. Liu[1], K. Chance[1], G. Gonzalez Abad[1] and C. Chan Miller[2]

[1] Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138, USA

[2] Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138, USA

Dear Dr. Lindstrot,

Thank you very much for your comments. Our reply to each of your comment is listed below.

1. While it is more consistent to use only one unit throughout the paper, a reader may prefer one unit over another. We therefore used both molecules cm^{-2} and cm (precipitable water) for column water vapor, and provided the conversion factor (2.98904×10^{-23}) in Section 4. To further facilitate unit conversion, we will use both units on the color bars of the top row of Figure 5ab, as shown below.
2. We are adding MEdium Resolution Imaging Spectrometer (MERIS) (Lindstrot et al., 2012) and Global Navigation Satellite System (GNSS) (e.g., Lee et al., 2013) to the introduction.
3. Thanks for providing the link to download GlobVapour data. As mentioned in the last section of the paper, a thorough validation is part of our future work. The results in Section 4 are from our initial validation effort. To make it clear, we are changing the beginning of Section 4 to "In this section, we present our initial data validation results. A more comprehensive data validation will be performed in the future. In this paper, we compare our VCDs with the MODIS near-IR data, the GlobVapour combined MERIS+SSMI data and the AERONET ground-based measurements."

   We started out doing comparison with AQUA MODIS since it is closer to the OMI local time of observation (~ 2 pm). The GlobVapour MERIS+SSMI product is a valuable dataset for our future more extensive validation. In this paper, we are adding Figure 5b where we have performed a quick comparison using data for January and July of 2006. We find generally better agreement with GlobVapour product than with MODIS near-IR product in the tropics over the ocean. We are renaming the original Figure 5 as Figure 5a. We are also adding the paragraph below in Section 4 right before the AERONET paragraph–

" The GlobVapour project supported by the European Space Agency (ESA) Data User Element (DUE) programme has generated a combined total column water vapor product from MERIS and SSM/I for 2003 - 2008 (www.globvapour.info). Following the format of Figure 5a, in Figure 5b, we use the monthly mean 0.5º x 0.5º GlobVapour MERIS+SSM/I data to compare with our OMI data at the same spatial resolution for January and July of 2006. The combined MERIS+SSM/I product apparently has much better spatial coverage than the MODIS product. Our OMI product correlates well with the GlobVapour product. The linear correlation coefficients are 0.94 for both January and July of 2006. The OMI results generally agree better with MERIS+SSM/I than with MODIS in the tropics over the ocean, although for certain land areas and time, such as southern Africa in January and eastern China in July, the opposite applies. The mean of OMI - GlobVapour is -0.40 cm in January and -0.30 cm in July, with a standard deviation of 0.53 cm and 0.50 cm, respectively."

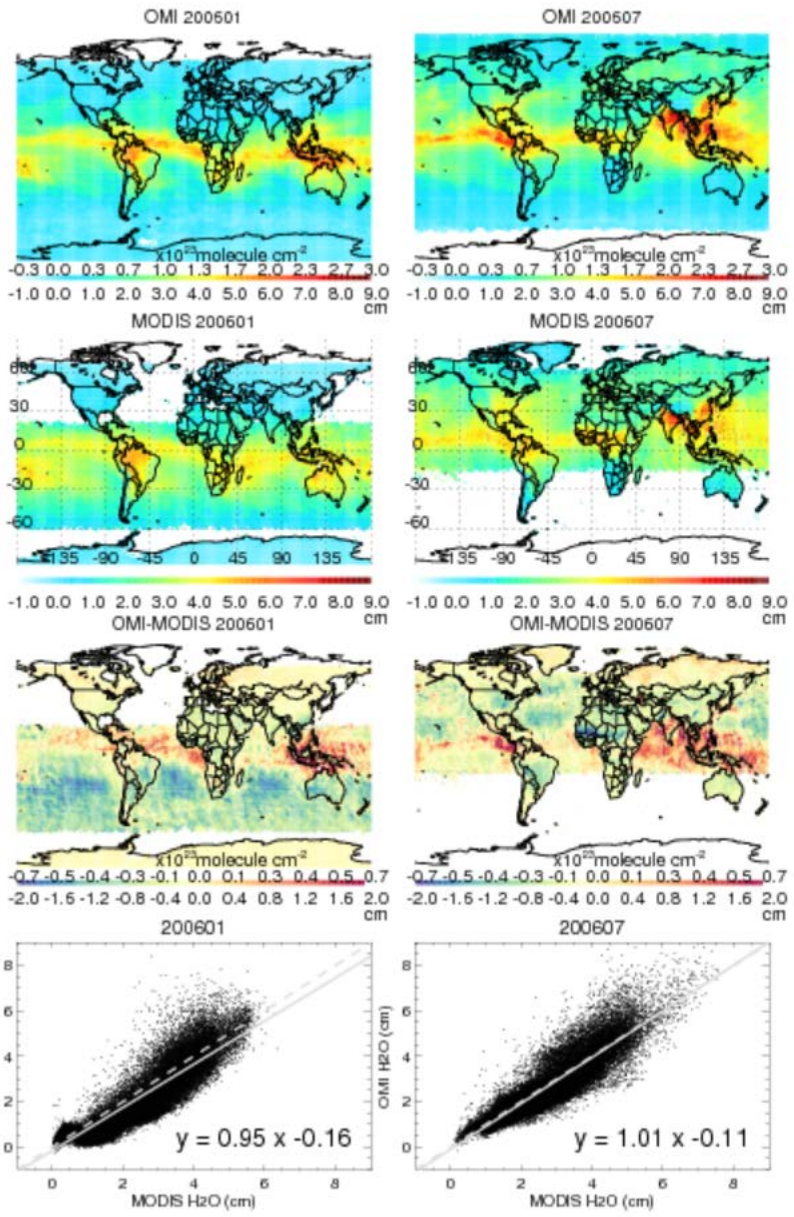

Figure 5a. The top row shows the monthly mean 1º x 1º OMI total precipitable water (cm) for January and July of 2006 derived from the standard retrieval. The second row shows the corresponding MODIS near-IR results. The third row shows the OMI-MODIS difference (cm). The bottom row shows the scatter plots of MODIS versus OMI results. The 1:1 line is indicated by the gray dashed line in the bottom panels. The regression line represented by the equation in the bottom panels is indicated by the gray solid line.

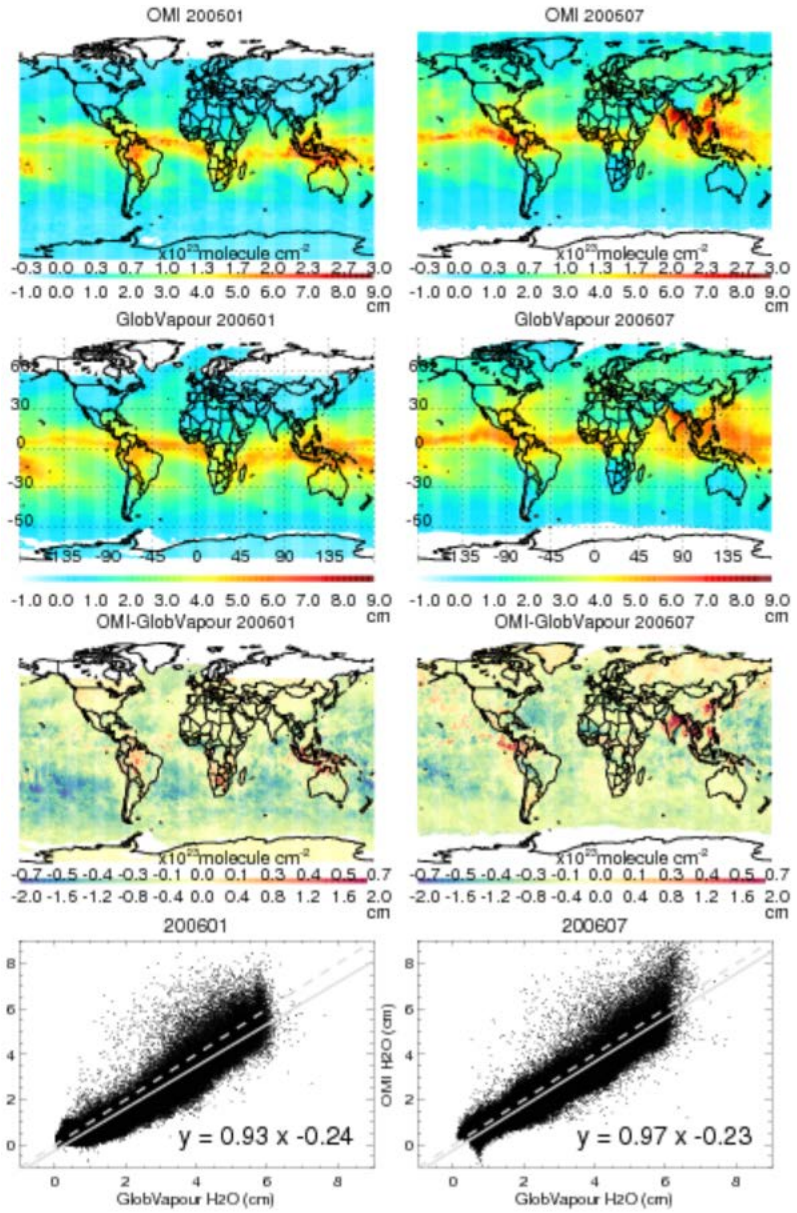

Figure 5b. The same as Figure 5a, but for comparison with the monthly mean 0.5º×0.5º GlobVapour MERIS+SSM/I data.