Atmos. Meas. Tech. Discuss., 7, C213–C214, 2014
www.atmos-meas-tech-discuss.net/7/C213/2014/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Water vapor retrieval from OMI visible spectra" *by* H. Wang et al.

Anonymous Referee #1

Received and published: 19 March 2014

Wang et al. present an algorithm for the retrieval of water vapor columns from spectral measurements in the blue spectral range. Such a retrieval is of high relevance, as it allows a consistent retrieval over land and ocean, and it can be applied to OMI measurements.

I recommend publication on AMT after dealing with the following comments.

Section 2.2.2: The authors find a strong effect of the in/exclusion of the spectral absorption of liquid water, at least for the wide fitting windows. Interestingly, the exclusion of liquid water results in the lowest statistical uncertainty of SCDs, though the results are obviously biased. I suspect that the liquid water absorption is not perfect (as it is hard to measure accurately in this spectral range). Please discuss.

Section 3: While the retrieval of SCDs is described in detail in 2.2.1, and sensitivity

studies of the impact of fit window and cross sections are provided in 2.2.2, section 3 is rather sketchy, and sensitivity studies are missing. Please add a description of the treatment of clouds for the calculation of AMFs. Are they considered to be lambertian reflectors, or 3d scattering objects? Note that the cloud pressure derived from O2-O2 absorption can not be interpreted as physical cloud top pressure (see Acarreta et al., 2004). This should be discussed, and page 549 line 16 should be modified accordingly. This has a high impact on the H2O AMFs due to the low scale height of H2O! Please discuss why monthly mean profiles can be used for the calculation of AMFs despite the high temporal and spatial variability of atmospheric water vapor.

Page 550, line 9: 2.99e-23 should be sufficiently precise. I would appreciate if one unit for water columns would be used consistently throughout the paper.

Page 550, line 20: I agree that there is a clear correlation between MODIS and OMI, but I would not call it a "linear relationship"; there are clear systematic deviations from a linear relation (e.g. for January: for MODIS values of 2 cm, most OMI values are lower, while for MODIS values of 5 cm, most OMI values are higher). This non-linear relation should be discussed. Due to the different sensitivities of MODIS over land and over ocean, the comparisons should be performed separately for land and ocean as well.

Page 551, lines 15-16: Why are the stripes removed at this stage? I would recommend to perform a stripe correction based on SCDs, before the application of AMFs. Please discuss.

Page 552, lines 10-11: I recommend to exclude Mountain sites from the comparison due to the OMI ground pixel size. Especially for Mauna Loa, the comparison is meaningless.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 541, 2014.