Atmos. Meas. Tech. Discuss., 4, C788–C789, 2011
www.atmos-meas-tech-discuss.net/4/C788/2011/

Atmospheric Measurement Techniques Discussions

Interactive comment on "An improved tropospheric NO_2 column retrieval algorithm for the Ozone Monitoring Instrument" *by* K. F. Boersma et al.

Anonymous Referee #1

Received and published: 3 June 2011

This is an important manuscript. It contains several valuable objective improvements to a leading NO2 retrieval algorithm. The improvements include more accurate NO2 profiles, better destriping, and many aspects of the AMF calculations. The manuscript is generally very well written. I support publication in AMT after addressing several issues noted below.

What is the overall error in the v2.0 algorithm? How does that error compare to the error estimate in the v1 algorithm?

What are your major remaining concerns with the v2 algorithm? A paragraph would be helpful.

The aerosol study is valuable to assess the implicit behavior of the OMI cloud correction algorithm. However, the implicit mean aerosol pressure over the eastern US of 720 hPa (p2353) is concerning. This implies that half of the optical effect from aerosols is at pressures lower than 720 hPa. The cited references do not support so much aerosol aloft over the southeast US: Turner et al. (2001) is for the Great Plains and Liu et al. (2008) focuses on mineral dust. The aerosol profiles in Lewis et al. (2010) show most of the aerosol is within the PBL. More evidence is needed to demonstrate that such a low pressure (high altitude) is appropriate. For example, what does Calipso show over the Southeast US? Or INTEX-B? Fig 1 of Jennifer Hains' thesis is another good resource. I'm concerned that this low pressure implies an error in the ability of the cloud correction to properly treat aerosol.

Why does the v2 algorithm use an OMI surface reflectance from only three years of observations? Wouldn't a longer record lead to a better product?

Line 22 of p2349 comments that the effect of destriping has not been investigated for dates later than June 2007 when fewer rows are available for averaging. Please do check this effect.

Figure 13 would be clearer if the TM4 partial column were plotted in mixing ratio. The partial column depends on the vertical grid.

Specific:

P2344, how does the algorithm perform over snow and ice in winter?

L22, p2340, "to for"

L4, p2359, recommend changing "has become" to "is treated as being"

L5, p2359, recommend adding "is treated as" prior to residing

P2348, priciple

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 2329, 2011.