Atmos. Meas. Tech. Discuss., 5, C2544–C2546, 2012
www.atmos-meas-tech-discuss.net/5/C2544/2012/
© Author(s) 2012. This work is distributed under the Creative Commons Attribute 3.0 License.

Atmospheric Measurement Techniques Discussions

Interactive comment on "Calibration of the SBUV version 8.6 ozone data product" *by* M. T. DeLand et al.

M. T. DeLand et al.

matthew.deland@ssaihq.com

Received and published: 16 October 2012

NOTE: Our responses are inserted immediately after each referee comment, and begin with the characters '»'.

Specific Comments & Questions:

Section 2.2 - In discussing the snow/ice radiance method the authors explain that data over Antarctica is used because the radiance scenes are stable, have minimum aerosol contamination, and so forth. The implication is that short- and long-term temporal albedo changes over this region are small compared to the desired calibration accuracy. However, the useful area outlined in Figure 3 is very large – are there ground-truth

measurements of the albedo over Antarctica that support this assumption? Are there potential long-term trends in the true snow/ice reflectivity due to dust, etc.?

» The Jaross and Warner (2008) paper, which we reference, contains further discussion about the long-term stability of the Antarctic albedo. For example, one reference states that "Soot concentrations would need to increase by a factor of 100 to have a 1% effect on albedo". Another reference notes that South Pole aerosol extinction values are a factor of five lower than even relatively clean sites such as Mauna Loa and Barrow, Alaska. While our measurement region for this analysis is large, we intentionally avoid the continental edges that might be more likely to show long-term effects from rising temperatures.

Section 4.2 – It's not obvious to me how Figure 13 provides clear evidence that there is a long-wavelength contamination problem in the 240-290 nm signal. Suggest you make this more obvious. (the correlation between short- and long-wavelength albedo shown in Figure 14, on the other hand, makes the point very clearly). Also, regarding the derived OOB contamination levels shown in Figure 15 – how are these factors used in the retrievals? Is this signal level (e.g., 14% at 273 nm) subtracted from the data in order to correct for the OOB error? Are the errors parameterized in terms of the primary scene variables – SZA, reflectivity and ozone column density?

» The rapid decrease in zenith sky radiance at wavelengths below ~320 nm in Figure 13 is caused by ozone absorption. We would expect this decrease to continue smoothly down to the instrument noise level at 290 nm, and to have essentially constant signal level shortward of 290 nm. The presence of a non-zero and steadily increasing signal between 240 nm and 290 nm demonstrates that there is an additional source of light contributing to the observed signal. We have revised the text to clarify this point.

Revised Text (p. 5170, lines 11-14). Figure 13 shows the spectrum of a ground-based zenith sky measurement with the FM#8 instrument currently flying on the NOAA-19 spacecraft. The radiance values below 290 nm should be constant at the instrument noise level due to atmospheric ozone absorption. However, there is a steady increase in the observed signal between 240 nm and 290 nm, which we attribute to contamination from signals at longer wavelengths.

» The reviewer is correct that the calculated OOB error (as shown in Figure 15) is subtracted from the observed signal before implementing the ozone retrieval algorithm. The OOB error calculation is parameterized as a function of SZA, reflectivity (both magnitude and nominal pressure level of surface), and total ozone (including profile shape). We have added this information to the text.

Revised Text (p. 5171, line 9). The complete OOB error is parameterized as a function of solar zenith angle, reflectivity at 331 nm, nominal pressure level for the reflecting surface, total column ozone, and nominal profile shape (low, middle high latitude) for each scene.

Minor comments and corrections:

Section 3.2 - The word "residue" is used several times in this section in place of "residual". I think the latter should be used for consistency.

» We agree with the reviewer's suggestion. However, we did not find any remaining uses of "residue" in the current text.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 5151, 2012.