

Interactive comment on “Optical backscattering properties of the “clearest” natural waters” by M. S. Twardowski et al.

M. S. Twardowski et al.

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This review was very useful and helped improve the manuscript. We personally thank the reviewer for his/her excellent comments and criticisms.

With respect to calibration with the beads and verifying the size distribution, some comments were added to the text to address this. In total, our justification for using the size distribution reported on the bottle is:

- 1) as mentioned, some bead size distributions have been verified with a Coulter Counter; fresh beads purchased from Duke Scientific have consistently conformed to the reported distributions on the bottle;
- 2) as mentioned, calibration with one size bead was verified with measurements in solutions of beads of another size;

3) Theoretical VSFs computed from Mie theory based on the size distributions reported on Duke Scientific bead bottles have previously been replicated at 1 angle resolution with a bench top scanning VSF device in the lab; and

4) The same beads have been used by others to calibrate several VSF type devices with similar success;

Regarding the comment on improving uncertainties with additional depth average binning: yes, the values would still be slightly negative, but the uncertainty (the standard error) would improve with additional averaging.

Regarding the independence of the measurements on an ECO-BB3, the measurements at 532 and 650 nm are made in the same sensor head, but with separate detector and source optics. Even though both measurements were calibrated concurrently in the same bead solutions, the calibrations are still unique with unique calibration constants. All WET Labs sensors are calibrated using the same 2 μm bead solutions and we would consider those sensors to all provide independent measurements. For arguments sake, the only possible feedback I can think of between the 2 channels is if one channel is approaching saturation there can be an artificial depression in the signal of another channel because the electronics multiplexer starts to overload. But this is not a concern in this data.

The suggested edit "30% increase" was added.

The comments about bb(462) and the associated effects of coccoliths are very well taken. The reviewer's view has been added to the text and the paragraph in the discussion that attempted to interpret the effect has been removed.

The observation of fluorescence contamination in backscattering measurements has been observed previously in Hydroscat bb measurements at 671 nm. Twardowski collaborated with Mary Jane Perry in a lab experiment in 2000 to document this, but the results were never published. Emmanuel Boss and Collin Roesler have also doc-

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umented this effect. Moreover, the apparent presence of fluorescence structure in oceanic reflectance spectra suggests that fluorescence contamination in backscattering measurements may be possible.

Thank you again for your comments.

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