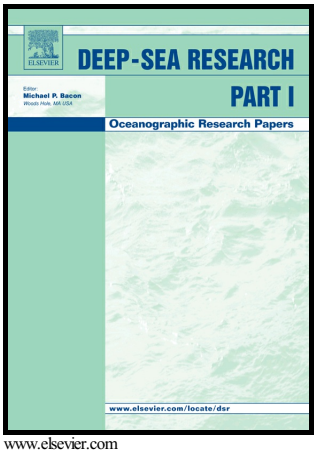

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Meg Estapa, Colleen Durkin, Ken Buesseler, Rod Johnson, Melanie Feen

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Carbon flux from bio-optical profiling floats: calibrating transmissometers for use as optical sediment traps

Meg Estapa[a*], Colleen Durkin[b1], Ken Buesseler[b], Rod Johnson[c], Melanie Feen[a]

[a]Department of Geosciences, Skidmore College, Saratoga Springs, NY, USA
[b]Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA, USA
[c]Bermuda Institute of Ocean Sciences, St. George's, GE01 Bermuda

[*]Corresponding author: M. L. Estapa, Department of Geosciences, Skidmore College, 815 N. Broadway, Saratoga Springs, NY, 12866, USA, Email: mestapa@skidmore.edu

Abstract

Our mechanistic understanding of the processes controlling the ocean's biological pump is limited, in part, by our lack of observational data at appropriate timescales. The "optical sediment trap" (OST) technique utilizes a transmissometer on a quasi-Lagrangian platform to collect sedimenting particles. This method could help fill the observational gap by providing autonomous measurements of particulate carbon (PC) flux in the upper mesopelagic ocean at high spatiotemporal resolution. Here, we used a combination of field measurements and laboratory experiments to test hydrodynamic and zooplankton-swimmer effects on the OST method, and we quantitatively calibrated this method against PC flux measured directly in same-platform, neutrally buoyant sediment traps (NBSTs) during 5 monthly cruises at the Bermuda Atlantic Time-series Study (BATS) site. We found a well-correlated, positive relationship (R^2 = 0.66, n = 15) between the OST proxy, and the PC flux measured directly using NBSTs. Laboratory tests showed that scattering of light from multiple particles between the source and detector was unlikely to affect OST proxy results. We found that the carbon-specific attenuance of sinking particles was larger than literature values for smaller, suspended particles in the ocean,

[1] Present address: Moss Landing Marine Labs, Moss Landing, CA, 95039, USA