

Optical assessment of the particle size distribution for the GEOTRACES Alaska-Tahiti Transect

Andrew McDonnell

This proposal would integrate two in situ optical instruments with the CTD rosette in order to assess the concentrations and size distributions of particles in conjunction with the core measurements of the GEOTRACES program on the upcoming Alaska-Tahiti transect. Combined measurements from the Laser In Situ Scattering Transmissometer (LISST-DEEP) and the Underwater Vision Profiler 5 (UVP5) will allow for an assessment across a wide range of particle sizes (2.5 μm - 2.5 cm). The UVP5 is capable of full depth profiles to 6000 m whereas the LISST has a maximum depth limit of 3000 m and would be deployed on the shallow casts of the GEOTRACES cruise. Information about particle concentrations as a function of size, and the related metrics that can be computed from it (such as particle surface area) will be used to develop and test hypotheses and models of trace metal-particle interactions, sources, sinks, and transport. Recent data from the 2015 P16N US Hydrography cruise revealed fascinating features of large particulate matter including regions of deeply penetrating particles at the equator and at the boundary between the subtropical and subpolar gyres, as well as a widespread upper mesopelagic maximum in particle concentration (see figure). These types of size distribution observations would be very powerful when made in conjunction with trace elements and isotopes in both the dissolved and particulate phases and the value of linking these types of observations has been detailed in the 2015 GEOTRACES special issue in Progress in Oceanography. This data could be collected at relatively low cost, would require no additional dedicated wire time on the cruise, and require only a partial berth to oversee the operation of the instruments.

