

Thorium-234 and Thorium-228 as Tracers of TEI Export and Regeneration

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Scientific justification and overall sampling operations

We plan to submit a proposal to participate in the Alaska Tahiti GEOTRACES section with a focus on the short lived Th isotopes (^{234}Th - $t_{1/2} = 24$ days and ^{228}Th - $t_{1/2} = 1.9$ years) at high spatial and vertical resolution. These short-lived Th isotopes are ideal for the study of upper ocean particle export, mesopelagic export and remineralization, particle aggregation/disaggregation rates throughout the ocean, and scavenging associated with benthic nepheloid layers. TEI fluxes and remineralization rates are determined by linking the ratio of TEIs/Th measured on particles.

Based upon feedback at a recent GEOTRACES/OCB workshop at LDEO, we also propose a modest trapping component be considered, to collect sinking material at the super stations at a few upper ocean depths to compare to the small and large size class particles collected with in-situ pumps. We would collect and help process and distribute TM clean trap samples.

Sample and berth requirements

This project requires water from the standard CTD and LVPs per prior GEOTRACES cruises. A drifting trap array with 3 depths in upper 300-500 m, would take 1 hour to deploy and 2 to recover. Deployment times could be as short as 36-48 hours. A shallow CTD cast is needed for filling the trap tubes and for making TM clean brine. We feel traps are worth considering at the October planning workshop, since it would add direct sampling of sinking particles for many key TEI's, Th, and major flux components, genomics, etc.. Our prior experience suggests that this effort will require 2-3 berths, depending upon our responsibility for helping with LVPs, the collection of higher resolution water samples in the upper ocean used for pigments and ^{234}Th , and the frequency of proposed trap deployments.