

Anderson GP17 Statement

Long-loved U & Th series nuclides

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We propose to measure concentrations of dissolved and particulate ^{230}Th , ^{232}Th and ^{231}Pa along both cruises (GP17-ANT and GP17-OCE). Our principal immediate research goals include:

- 1) Combining ^{230}Th and ^{232}Th to quantify the flux of dust the study area,
- 2) Combine estimates of dust flux with results from other groups that study Fe and other TEIs to quantify the fluxes of these TEIs from dust,
- 3) Collaborate with other groups using independent estimates of TEI supply (e.g., aerosol deposition from ^7Be), removal (e.g., export fluxes calculated using ^{234}Th), and lateral sources (e.g., ^{228}Ra) to constrain full upper water column budgets for TEIs,
- 4) Exploit the unique properties of ^{230}Th and ^{231}Pa to characterize distinctive scavenging regimes among the contrasting environments along the GP17-OCE cruise section, encompassing the South Pacific Gyre with the lowest productivity and particle flux in the global ocean to the more biologically productive frontal regimes of the Southern Ocean, where we can examine the sensitivity of scavenging intensity to changes in dominant phytoplankton taxa as well as to changes in total biomass, and
- 5) Exploit the well-known mass balance of ^{230}Th to construct full water column profiles of the sinking fluxes of POC, particulate nutrients, and particulate TEIs.

Application of these radionuclides along the Antarctic margin (GP17-ANT) represents a more exploratory venture, but based on work done at other ocean margin systems we anticipate that the combined use of ^{230}Th and ^{232}Th will offer unique insight into margin sources of TEIs.

These objectives each support the GEOTRACES mission in that they either help constrain the supply and removal of TEIs at ocean interfaces (GEOTRACES Theme 1) or they place quantitative estimates on rates of internal cycling of TEIs within the ocean (GEOTRACES Theme 2).