Long-lived Th isotopes and <sup>231</sup>Pa

Bob Anderson (Lamont-Doherty) and Larry Edwards (Univ. Minnesota) plan to submit a collaborative proposal to study dissolved and particulate concentrations of <sup>230</sup>Th, <sup>232</sup>Th and <sup>231</sup>Pa along the Peru-Tahiti section

## SCIENTIFIC OBJECTIVES:

1) Quantify the spatial pattern of scavenging intensity across the gradient in biological productivity (and related flux of biogenic particles) from the productive Peru upwelling system to the oligotrophic gyre. Recent work in the N. Pacific and in the N. Atlantic found surprisingly small lateral gradients in the concentrations of dissolved <sup>230</sup>Th and <sup>231</sup>Pa, raising questions about the longstanding hypothesis of boundary scavenging. Sampling across the extreme gradient in particle flux along this section will be critical to further testing of this hypothesis by quantifying the preferential removal of TEIs at ocean margins.

2) Quantify near-bottom removal of particle-reactive elements, especially associated with nepheloid layers

3) Quantify scavenging rates within the hydrothermal plume from the East Pacific Rise and contrast these rates with those in surrounding deep waters.

4) Establish sensitivity of partition coefficients to particle composition.

5) Test fidelity of sediments as a recorder of deep water dissolved  $^{231}$ Pa/ $^{230}$ Th ratios.

6) Use the  $^{232}$ Th- $^{230}$ Th pair to quantify the aeolian supply of dissolved trace metals.

## SAMPLE NEEDS:

1) Five liters of filtered water from the standard Niskin bottle at each station and each depth.

2) A minimum <sup>1</sup>/<sub>4</sub> split of particles from each Supor filter collected by in situ filtration.

3) A small number of aerosol samples to test the solubility of Th.

## ANTICIPATED SCIENTIFIC COLLABORATORS:

1) All PIs studying scavenging and removal of TEIs along the section, especially the PIs who collect particles by in situ filtration.

2) PIs studying boundary exchange using Nd isotopes and REE concentrations

3) PIs studying trace metal solubility of aerosols and dust fluxes. We have initiated a pilot study with Ana Aguilar-Islas on the US GEOTRACES North Atlantic section, establishing protocols that we wish to continue on the Pacific section.

4) PIs studying <sup>7</sup>Be to test for consistency of two novel methods for quantifying dust flux.

## BERTHS and LOGISTICS

We anticipate that the protocols for sampling the standard Niskin rosette on the Peru-Tahiti section will be similar to those used during the North Atlantic section. If so, then we need one berth from the Th-Pa group and anticipate that one berth will be filled by another group. Two berths are an absolute minimum to sample for long-lived Th-Pa, Nd-REE, <sup>210</sup>Pb-<sup>210</sup>Po, fallout nuclides, Ba (and other non-contamination prone TEIs) and Si isotopes (dissolved). Sampling protocols and gear used to sample the Niskins on the N Atlantic cruise were developed at Lamont, so we believe that at least one of these berths should be filled by a person from Lamont who is familiar with these procedures.