# $^{234}$Th, $^{228}$Th and Ra isotopes

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Ken Buesseler, Billy Moore, and Matt Charette plan to submit a proposal Feb 15th for Pacific GEOTRACES. The focus is on the shorter lived U/Th series (234Th, 228Th and all 4 Ra isotopes), which are ideally suited to study the sources and sinks of TEIs on time and space scales that are required to interpret lateral and vertical distributions of the TEIs in this basin. We have considerable experience with these tracers, including our leading the GEOTRACES intercalibration of these isotopes and participation in the GEOTRACES Atlantic cruises.

The sampling effort requires small volume samples from the CTD (4L 234Th), larger volumes from surface pumping (for Ra isotopes), and large volume samples for vertical profiles of dissolved & particulate 228Ra and 228Th. We are assuming there will be a separate large volume in situ pump effort, and that we would attach a single Mn cartridge to the flow path after filtration. We would be analyzing the cartridge for Ra and Th isotopes, and at least part of a particle filter (of about 500L equivalent) for $^{228}$Th and 234Th. For radionuclides alone, we do not need specialized pumps or trace metal clean sampling. Equipment built up for the Atlantic GEOTRACES cruises (Vectran trace metal clean line to hang pumps, pump filter holders, Mn cartridge housings, flow meters and specialized plumbing for McLane pumps) will be reused at significant savings to the project.

In addition to the water collected using standard CTD/Rosette casts, two casts with 8 in situ pumps each will be needed, one shallow (6hrs) and one deep (9-10 hrs, and only at stations where the bottom exceeds roughly 1000-2000 m); therefore most full ocean depth stations will have a 16-depth profile for large volume particulates and radioisotopes. We expect this effort will require 3 berths, assuming a separate group is funded for the large volume pumping and responsible for the filters used for TEI's and other radionuclides. We have found this combination of water sampling, large volume pumping, and on board detection of short lived Ra and Th isotopes, allows for the most efficient use of wire time and berths required for collection of these 6 isotopes.