

GEOTRACES US Arctic Letter of Intent (25 Sept. 2013)

Proposed title: “**Distribution of particulate and dissolved ^{210}Po and ^{210}Pb across contrasting zones during the GEOTRACES transect in the western Arctic**”

Proposed collaborative PI's:

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1) Research goals and relevance to the overall objectives of the section:

The ^{210}Po and ^{210}Pb natural radionuclides have long been exploited to quantify the flux and cycling of key trace elements at ocean interfaces. Our intent is to continue ^{210}Po and ^{210}Pb measurements in dissolved and particulate phases along the GEOTRACES western Arctic transect. The goal will be to quantify biogeochemical processes of key trace elements across key ocean zones in the western Arctic. Relevant is the distribution of ^{210}Po and ^{210}Pb targeted to include: 1) comparison of the scavenging intensity of Po and Pb in nutrient-enriched Pacific waters with that of terrigenous particulate material-dominated area; 2) comparison of scavenging intensity of Po and Pb in waters with varying nitrate/phosphate ratios of the key shelf areas in Chukchi shelf; 3) comparison of scavenging intensities of Po and Pb in the Canada Basin and in Makarov Basin, and 4) loading of ^{210}Po and ^{210}Pb at the air-sea interface in the Arctic.

2) Sample requirements:

- i) Filtered 20-L samples in vertical profile at the super stations in the Canada and Makarov Basins and important shelf stations in the Chuckchi Sea;
- ii) Particulate aliquots collected at the same stations depths using large-volume in-situ filtration system (equivalent to 100-200 L);
- iii) Aliquot of the >51 micron particulate samples from the same large-volume filtrations (equivalent to ~200 L); and
- iv) Aliquots of the large volume aerosol samples (~20 SCM).

3) Berth requirements

One berth is required for the field sampling of either water or pumped particulate samples. As in past with limited berths, we can share these sampling duties with other participating pumped or large volume radionuclide groups.

4) Anticipated collaboration and synergies:

Groups complimentary to ^{210}Po - ^{210}Pb short term radiometric modeling include:

- 1) Circulation of waters with coastal or benthic origin (e.g., ^{224}Ra , ^{226}Ra , ^{228}Ra)
- 2) Particle scavenging and remineralization (e.g., $^{228}\text{Ra}/^{228}\text{Th}$, ^{230}Th , ^{231}Pa groups)
- 3) Export carbon production and particle cycling (e.g., ^{234}Th)
- 4) Atmospheric scavenging and deposition (e.g., ^7Be)