

## Statement of Interest

### **Helium isotopes/Neon/Tritium, and Stable Isotopes of Water along the GEOTRACES section between Alaska and Tahiti**

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The Lamont noble gas group is interested in measuring noble gases (helium/neon isotopes), tritium, and stable isotopes of water along the Pacific GEOTRACES section from Alaska to Tahiti (GEOTRACES section GP15).

Our interest in this GEOTRACES section is related to two scientific questions:

- (1) Hydrothermal flux normalization using He isotopes, and
- (2) Connection of the Arctic Ocean to the North Pacific subpolar and subtropical gyres via fluxes through Bering Strait.

(1) We are interested in supporting the hydrothermal component of the GEOTRACES project. A primary goal of this section is to study the impacts of this hydrothermal input on ocean biogeochemistry. Of particular interest is to constrain the input of iron and other trace metals, define their budget and the significance of their hydrothermal input (vs other inputs such as dust deposition, upwelling or lateral input from margins) for their marine biogeochemistry.

We believe that on this transect helium isotope data will be critical for interpreting the trace element and isotope data. Hydrothermal vent fluids are highly enriched in Helium-3 and, given the conservative nature of helium in the ocean and the sensitivity of the signal, it can be traced 1000s of kilometers from the hydrothermal source. As recently demonstrated by Resing et al (2015) along GP16, parallel measurements of TEIs and helium isotopes would therefore allow to (1) map the hydrothermal plume and track the fate of the TEIs discharged by the hydrothermal systems from (a) the Juan de Fuca Ridge, (b) the major EPR plume at 15N, and (c) the Loihi plume, (2) quantify their sources and sinks and (3) establish key questions such as how much of the hydrothermal iron is present in the far-field of the plume. In addition to providing a tool to map the TEI fluxes, helium isotopes along GP16 can be compared to earlier WOCE and CLIVAR P16 sections to evaluate the temporal evolution of the North Pacific hydrothermal plumes.

(2) A second focus of our interest is to extend the recently completed US Arctic GEOTRACES section from Bering Strait to the central North Pacific. Such an extension would allow us to gain insight into the sources of Bering Strait inflow waters, the freshwater components carried by these waters, as well as pathways and mean residence times of North Pacific waters as they travel through the Bering Sea into the Arctic Ocean. Based on hydrographic and tracer measurements we expect to obtain results on the flow regime that connects the North Pacific to the Arctic Ocean. Such information is important in terms of better understanding of the dynamics of this coupling. In addition, it will provide information on sources and fluxes of TEI's into the regions sampled by Arctic GEOTRACES.

We will be happy to coordinate with other noble gas groups that have similar interests and plans.