Collaborative Research: GEOTRACES - 210Po and 210Pb distribution at Eastern Pacific Interface Regimes

ABSTRACT

In 2013, a multi-institutional team of U.S. marine chemists and geochemists will launch a major expedition to the Pacific Ocean to map and study the distribution of trace elements and isotopes as part of the International GEOTRACES Program. Because of their proven value as natural tracers of both sedimentation dynamics and hydrodynamics in the sea, radioactive daughter isotopes in the natural U-Th radionuclide series will be of immense value to all GEOTRACES researchers. In particular the naturally-occurring Pb210/Po210 radioisotope pair would be useful for quantifying rates of particulate scavenging of other trace elements and isotopes of interest in the U.S.GEOTRACES Pacific campaign. This is because these two isotopes are themselves particle-reactive and radioactive, thus providing a natural clock for tracking the vertical transport of other particle-reactive substances.

In this project, researchers at Wayne State University and CUNY Queens College will sample and analyze several hundred dissolved and particulate (large and small) samples for 210Po and 210Pb along the U.S.GEOTRACES Eastern South Pacific section. About two thirds of the samples will be focused at six so-called "super stations" (sites chosen for intensive study), half above the main thermocline and the other half down across the benthic nepheloid layer (the zone of suspended...
material extending several meters above the seafloor). The depths will be chosen according to regional atmospheric input, ecosystems, and coordinated with sampling by other researchers onboard. The other third will be taken within the hydrothermal plume in the vicinity of the East Pacific Rise. The data will be synthesized according to interface scavenging models by particle types (e.g. fine/colloidal, lithogenic and biogenic). As such, the proposed work will be closely coordinated with that of other U.S.GEOTRACES PIs funded to study other particle-reactive or dissolved trace elements and radionuclide isotopes during the campaign.

BROADER IMPACTS: The broader impacts are closely linked to those of the GEOTRACES Program as a whole: to enhance (1) research infrastructure by providing a broad array of 210Po and 210Pb data useful for biogeochemical scavenging models, (2) education by mentoring graduate and undergraduate students, teaching by example from proposed research, (3) participation of under-represented students interested in careers in the geosciences, (4) research training of graduates in marine radiochemistry, and (5) public dissemination of results through publications, presentations, and on a dedicated public website at Wayne State University.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

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