**Award Abstract #0961351**

**Collaborative Research: GEOTRACES - Application of 210-Pb and 210-Po distribution at North Atlantic interface regimes**

**NSF Org:** OCE
Division Of Ocean Sciences

**Initial Amendment Date:** March 25, 2010

**Latest Amendment Date:** June 6, 2011

**Award Number:** 0961351

**Award Instrument:** Standard Grant

**Program Manager:** Donald L. Rice
Division Of Ocean Sciences
GEO Directorate For Geosciences

**Start Date:** April 1, 2010

**End Date:** September 30, 2014 (Estimated)

**Awarded Amount to Date:** $101,284.00

**Investigator(s):** Mark Baskaran baskaran@wayne.edu (Principal Investigator)

**Sponsor:** Wayne State University
5057 Woodward
Detroit, MI 48202-3622 (313)577-2424

**NSF Program(s):** CHEMICAL OCEANOGRAPHY

**Program Reference Code(s):** 9150, 9189, 9198, EGCH

**Program Element Code(s):** 1670

**ABSTRACT**

Trace elements and isotopes (TEIs) in the natural U-Th radionuclide series are central to the goals of the U.S. GEOTRACES during its funded North Atlantic phase over the next three years. The radionuclide 210Po-210Pb pair is designated as one of the priority TEIs by the U.S. GEOTRACES Zonal North Atlantic Survey Section Implementation Plan. The pair has seen application since GEOSECS for quantifying particulate scavenging and carbon flux within the ocean, but processes are still poorly understood at oceanic interfaces. The atmospheric source and half lives of the two isotopes (138 d and 22.3 y) present time frames uniquely suited to trace interface (air-water, bio-water, and sediment-water) processes in the North Atlantic sections.

Under this award, researchers at the University of Delaware, Wayne State University, and Queens College will participate in the U.S.GEOTRACES North Atlantic campaign to study the relationships between these two radioisotopes and the other trace elements and isotopic tracers that will be surveyed. Their work will center around a set of hypotheses. At the air-sea interface, they hypothesize that as the primary input of 210Pb into the surface ocean, levels will be source dependent on the continental input mixtures, in the western temperate and easterly sub-tropical sections. At the biotic-water interface,
they hypothesize that different biogenic particle types encountered in the upper waters will affect the fractionation and remineralization depths of 210Po and 210Pb. At the particle-water interface, they hypothesize that interfaces between intermediate lithogenic nepheloid layers (INL) or hydrothermal plumes will be zones of enhanced 210Po and 210Pb scavenging from the surrounding waters.

To test these hypotheses, they will sample and analyze several hundred dissolved and particulate (large and small) samples for 210Po and 210Pb along the GEOTRACES North Atlantic section. About two thirds of the samples will be focused at the six designated "super stations", half above the main thermocline and the other half down across the BNL. The depths will be chosen according to regional atmospheric input, ecosystems, and coordinated TEI sampling. The other third will be detailed across INL detached plumes from coastal waters, across the BNL, and within hydrothermal plumes. 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 GEOTRACES PIs already funded to for other particle-reactive (e.g. Th, Pa) or dissolved (e.g. Ra) radionuclide isotopes in the Atlantic Survey Section of GEOTRACES.

Broader Impacts: The broader impacts are closely linked to 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 undergraduates, teaching by example from proposed research, (3) participation of under-represented students careers in the geosciences, (4) research training of graduates in marine radiochemistry, and (5) broad dissemination of results through publications, presentations, and on dedicated public UD websites (www.ocean.udel.edu) and at GEOTRACES (www.geotraces.org).

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Note: When clicking on a Digital Object Identifier (DOI) number, you will be taken to an external site maintained by the publisher. Some full text articles may not yet be available without a charge during the embargo (administrative interval).

Some links on this page may take you to non-federal websites. Their policies may differ from this site.


Please report errors in award information by writing to: awardsearch@nsf.gov.