

GEOTRACES GP17 Section: Measurement of ^7Be as a Tracer of Upper Ocean Processes

I am requesting support to attend the GEOTRACES Southern Ocean GP17 Planning Workshop. My interest lies in measuring the distribution of ^7Be within the upper ocean, likely within the OCE section. Many processes in the ocean cannot be directly observed and as such, tracers are used to provide important constraints on their rates and pathways. Be-7 is a tracer that, because of its half-life (53.3d), allows the study of processes which occur over time (seasonal) and spatial (shallow thermocline) scales that are otherwise difficult to obtain but which are critically important to studies of biological production, nutrient regeneration, and atmospheric deposition, to name a few. Advances in sampling and analytical techniques, coupled with a better understanding of the behavior of ^7Be in ocean biogeochemical cycles, present us with an opportunity to fully utilize this tracer. The work will address key tasks formulated within the GEOTRACES Science Plan:

1) **Improve methods for quantifying the atmospheric deposition of TEIs:** Measurements of ^7Be in the surface waters and in the lower atmosphere along the cruise track will provide estimates of the atmospheric input of relevant TEIs. The atmospheric input into the global ocean is an important budgetary component of numerous chemical species, yet is very difficult to constrain. The data generated in this work will be available to allow ground-truthing of models of aerosol deposition and atmospheric input of trace elements.

2) **Provide realistic estimates of the underlying transport processes influencing measured TEI distributions:** Water column measurements of ^7Be provide a tracer of physical processes, such as mixing and upwelling, which redistribute biologically active species. Given quantitative knowledge of the circulation, mixing and ventilation of the water masses within which TEIs reside allows an assessment of the time- and space-integrated *in situ* biogeochemical behavior of these elements.

3) **Provide estimates of oxygen utilization rate (OUR) with the shallow thermocline.** The rate of oxygen utilization within the upper thermocline will be determined by water column measurements of ^7Be coupled with collected hydrographic data and observed oxygen distributions. The seasonal timescale afforded by ^7Be is ideal for estimating OUR within the shallow water just beneath the euphotic zone, where the most significant C remineralization is occurring.

The use of the ^7Be tracer has benefited the GEOTRACES program, providing important insights into upper ocean processes for the US expeditions in the Arctic, Atlantic and Pacific basins.

David Kadko
Applied Research Center
Florida International University
Miami, FL 33174
dkadko@fiu.edu