Measurement of selected anthropogenic radionuclides on the US GEOTRACES Tahiti-Antarctica-Chile (GP17) sections. Timothy C. Kenna (tkenna@ldeo.columbia.edu)

A. *Nature of the work* – I plan to submit a proposal to OCE by August 15, 2020 that will focus on determining concentrations of the anthropogenic radionuclides (ARs) including, ^{239}Pu, ^{240}Pu, ^{237}Np, and ^{137}Cs at selected full depth stations along the proposed cruise track. Samples would include filtered seawater, large volume filtered particulate material, chemisorption cartridges (for ^{137}Cs) deployed on the ship's surface supply and the McLane pumps at selected depths, and bottom sediment samples. We plan to continue successful collaborations with European colleagues (i.e., María Villa Alfageme and Elena Chamizo (U. Sevilla), Núria Casacuberta Arola and Marcus Christl (ETH), and Pere Masqué (ECU/UAB), allowing us to include ^{129}I and ^{236}U AMS measurements on samples collected along GP17.

B. *Interest* – At this point, I am primarily interested in participating in GP17-OCE. We would be prepared to take responsibility for filtering water from the standard rosette for other investigators as needed, sediment coring, cartridge deployment and retrieval, and assist the McLane pumping group as necessary. One berth is requested for this sampling.

C. *Justification in terms of GEOTRACES objectives* – In general, the ARs have many attributes that make them useful for studying processes that affect TEIs. In addition to being transient tracers, the different nuclides exhibit a range of particle reactivity (sediment water distribution coefficients, Pu>Np,Cs), and geochemical behaviors as well as provide a means to resolve different sources of radioactive contamination. This allows us to address processes such as advection (circulation tracers), sources and sinks (characteristic isotopic signatures), as well as processes related to scavenging and particle dynamics in regions influenced by different geochemical processes.

1. In alignment with an important goal of the GEOTRACES program, a major objective of our work will be to determine the concentrations of a suite of ARs with sufficient resolution to define their distributions at the basin scale along the proposed transect.
2. Characterize the ARs present in the different water masses encountered and evaluate how they evolve over the planned section with respect to composition (global vs. North Pacific regional fallout), proximity to local sources (i.e., near-field influence of nuclear weapons tests conducted in French Polynesia), and source specific transport behavior.
3. Evaluate and compare Pu scavenging intensity across the different geochemical regimes encountered along cruise track, including the low productivity South Pacific Gyre, the high productivity sub-Antarctic front, and Antarctic polar waters.
4. Analysis of samples collected on GP17-OCE together with samples obtained from GP15 will allow us to complete a north-south transect of selected AR inventories and inventory ratios. These can be compared to:
    a. Estimated fallout inventories delivered to the ocean surface as well as those measured in Antarctic ice cores in order to evaluate interhemispheric transport and elucidate the relative importance of vertical processes related to particle-water interactions compared to lateral processes related to advective transport with respect to the observed AR distributions.
    b. Available GEOSECS data collected in 1973, as well as more recent work in the vicinity of the planned cruise track will provide a means to assess changes in the AR water column distributions on multi-decadal timescales.