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Corresponding Author : Prof. Mark Baskaran (Baskaran@wayne.edu)

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Title: Particle-reactive Radionuclides as Tracers in the Biogeochemical Cycling of Contaminants in the Coastal and Estuarine Waters

Abstract: Particle-reactive radionuclides serve as a unique set of tracers that can be utilized to investigate not only their inherent biogeochemical behavior, but also to quantify the rates of processes that control their behavior in estuarine and coastal waters. Some of these nuclides are produced from nuclides that exhibit conservative behavior in estuaries while others are produced from nuclides that display non-conservative behavior. The removal rates of these particle-reactive radionuclides provide information on the removal rates of contaminant-laden particulate matter, the dissolved contaminants and the extent of resuspension of the contaminated sediments. Using the distribution of Be-7, Th-234, and Pb-210 in suspended particulate matter (≥0.5 um) and dissolved phase (< 0.5 um) as well as the distribution of Pb-210 and Pu-239,240 in sediment cores, we can answer the following questions: a) If a pulse-injection of these species take place, in what time scale will these nuclides be removed? b) Can we quantify resuspension of sedimentary particles and particle-laden contaminants using radionuclides? c) How many times are the sedimentary particles at the sediment-water interface recycled before they are removed from the estuarine/coastal system? d) Are there seasonal variations in the removal rates of these nuclides and if so, what factors cause this seasonal variation? e) What is the retention efficiency of these nuclides in estuaries? f) What factors and processes affect the retention efficiency in sediment cores? and finally g) How can one quantify the input from oceanic sources to coastal areas? Using our radionuclide data from Tampa Bay, Florida and select other major estuarine and coastal systems around the world, we will begin to address these questions. We have measured the activities of Be-7, Pb-210, and Th-234 in the particulate and dissolved phases from Tampa Bay, Florida during spring and summer seasons. The distribution and the removal rate constants during these two seasons are significantly different. Using a mass balance approach we can quantify the extent of sediment resuspension and identify the bottom source of these nuclides to the water column. We will also compare estuarine systems from relatively pristine areas to systems that are highly impacted by human activity. We will summarize our presentation with highlights for future work.

Presentation Mode:

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Co-Authors

No.	Title	First Name	Family Name	Organization
1	Dr.	Peter	Swarzenski	US Geological Survey, St. Petersburg, FL 33701, USA