Environmental Studies Program: Ongoing Study

Study Area(s): Central Planning Area GOM OCS

Administered By: GOM OCS Region

Title: Delineating Areas of Enhanced Sediment Accumulation in the Northern Gulf of Mexico (NSL #GM-14-03-03)

BOEM Information Need(s) to be Addressed: This study focuses on the organic matter cycling as related to pelagic/benthic habitat and oil fate. It will also partly address the availability of offshore versus nearshore sediment resources for coastal restoration by identifying areas of enhanced sediment deposition in the region.

Total BOEM Cost: $176,069 **Period of Performance:** FY 2015–2017

Conducting Organization(s): Louisiana State University

Principal Investigator(s): Kanchan Maiti, Ph.D., kmaiti@lsu.edu

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Description:

Background: The continental margin forms the key transformation zone between the shelf and deep basin regions, acting as a dynamic boundary for cross-slope exchange of salt, nutrients, pollutants (metals, PAH) and multiple forms of carbon. The transfer of organic carbon and particle reactive pollutants and particles from shelf to the deeper ocean can impact long term sequestration of carbon and pollutants in this region. The oligotrophic nature of Gulf of Mexico also makes this transport of shelf-derived organic matter an important food source for the benthic community present in the deeper Gulf and an important source of nutrients for the phytoplankton and microbial community in the water column. This supply of particles to the relatively particle starved region of the open GOM also plays an important role in supplying and scavenging particle-reactive pollutants like metals and PAH from water columns to sediments.

Objectives: The major objective is to utilize ^{226}Ra- ^{210}Pb- ^{210}Po disequilibria to understand: 1) shelf-basin interaction and lateral and vertical transport of sediments and particle reactive species, (2) estimate particle scavenging and determine removal rates of particle reactive species from the water column and (3) identify areas of enhanced sediment accumulation in the region. This Study will also estimate the seasonal scale fluxes of POC, examine how particle mixing rates/sedimentation rates vary across the basin and impact PAH, organic matter, and metal distribution in sediments and identify the source (marine or terrestrial) of sediment organic matter.

Methods: ^{226}Ra- ^{210}Pb- ^{210}Po disequilibria will be used to investigate the residence time of particulate matter in the water column, the flux of these particles from the shallower shelf-slope to the deeper regions of the gulf, and the particle mixing rates and sedimentation rates in the region. Additional information generated during this study

includes analyzing surface sediments for the concentration of Polycyclic Aromatic Hydrocarbons (PAHs), a group of compounds listed as priority pollutants by the U.S. Environmental Protection Agency; metals including Ba, Cd, Cr, Fe, V, Ni, Pb, and Zn; and particulate organic carbon (POC) collected from 22 stations across the Northern Gulf of Mexico.

Current Status: Lab work has been completed. Data analysis and interpretation are wrapping up. Results are being presented at the 2017 Goldschmidt conference in Paris, France on Wednesday, August 16, 2017 entitled *^{210}Pb-^{210}Po Disequilibria in a River Dominated Coastal System and its Implication for Sediment and Contaminant Transport*. The abstract can be viewed at the following: https://goldschmidt.info/2017/abstracts/abstractView?id=2017005010

Final Report Due: September 30, 2017

Publications Completed: Adhikari et al., 2015; Adhikari et al., 2016

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/100050

Revised Date: July 6, 2017