Formation and Fate of Iron Sulfide Compounds Following Simulated Dredged Sediment Placement in Coastal Wetlands

***Yadav Sapkota**, Jacob F. Berkowitz*
US Army Corps of Engineers, Engineers Research and Development Center, Vicksburg, MS, USA

Restoration projects are being implemented to address natural and anthropogenic threats to coastal wetlands, including sea level rise and historic landuse alterations. Dredged sediments can be used in restoration projects to increase elevation and stabilize marsh platforms. However, some dredged sediments contain iron sulfide minerals (FeS_x) or they form after sediment placement. Under aerobic conditions, such as drought, FeS_x oxidizes generating acidity that can dramatically lower soil pH, impacting plant establishment and threatening the success of wetland restoration projects. This talk communicates the results of two simulated dredged sediment placement experiments involving the formation and fate of FeS_x compounds under three hydrological scenarios including continuous inundation, tidal flushing, and drought. The dredged sediment used in the first experiment did not contain FeS_x but resulted in FeS_x horizon development initiated within 16 days, expanding to encompass > 30% of the soil profile after 120 days under continuously inundated and simulated tidal conditions. The second experiment introduced FeS_x rich dredged sediments which rapidly oxidized (< 21 days) after wetland placement across all treatments followed by declining oxidation reduction potentials, increasing dissolved Fe concentrations, and subsequent FeS_x re-precipitation in continuously flooded and simulated tidal treatments. Results suggest that FeS_x compound, whether deposited with dredged sediments or formed after wetland placement, pose minimal risk of acidification under prolonged saturated conditions.