Pathway Ranking for In-Place Sediment Management (PRISM)

Cleanup
CU-1209

Background:

Many of the contaminated marine sediment sites under investigation are in shallow coastal areas and are more likely than traditionally studied offshore sediments to be impacted by advective processes such as groundwater flow, tidal pumping, and wave pumping and by resuspension via ship and storm activity. While these processes are recognized as having significance to chemical fluxes, they are largely unstudied in contaminated systems, and the relative magnitudes of these processes, as compared to the traditionally assessed processes such as diffusion and bioturbation, have not been determined.

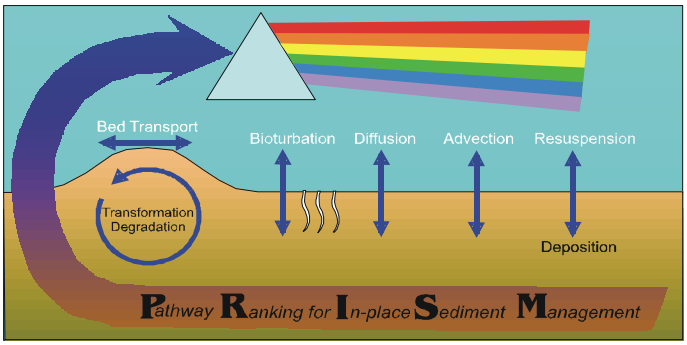
If impacted sediments are to be left in place, it is critical to evaluate potential pathways by which contaminants might pose an ecological or human health risk and to monitor, minimize, or eliminate these pathways. On the other hand, the relative importance of these pathways as mechanisms of sediment recovery must also be determined. Currently, there is no demonstrated, systematic process for measuring and evaluating contaminant transport pathways within sediment systems.

Objective:

The objective of this project is to provide a rigorous, science-based approach to determining the relative importance of contaminant transport pathways for coastal sediments. The project goals will be the following: (1) provide an integrated suite of measurement techniques to characterize critical contaminant transport pathways for in-place sediments, (2) provide a corresponding set of indices that quantify the transport phenomenon on a common dimensional scale, and (3) provide an understanding of the relative importance of these processes in the risk, fate, and management of contaminated sediments.

Summary of Process/Technology:

The program applies an integrated suite of methods for the direct characterization of dynamic transfer pathways for contaminants in sediments. Methods for the quantification of mechanisms, magnitudes, and directions of porewater-mediated contaminant transport will be integrated with sediment geochemical characteristics, hydrodynamically-driven particle transport, and biological processes. While each of these processes have been examined individually, this project is unique in that the processes will be examined together such that they can be ranked and compared to support in-place sediment management. The magnitude and rate of these contaminant transport pathways will be measured in the field, and results will be put into equations which allow for the generation of common time indices for these processes, and thus an identification of predominant pathways.



Benefit:

Results from this work will provide the tools necessary to quantify and rank contaminant transport pathways within sediment systems through characterization of the major processes which control contaminant transport in sediments together for the first time. The project will aid in the implementation and success of in situ remediation, stabilization, and containment strategies by supporting the proper selection of remedial actions based on a clear ranking of transport pathways. Monitoring of management technologies and strategies will also be possible as the same contaminant transport processes will determine the effectiveness of in situ treatment/containment or natural attenuation.

Accomplishments:

This is an FY 2001 New Start project.

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