Monitored Natural Recovery (MNR) Subgroup: Update

Members

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MNR Subgroup Objectives

Develop framework for the technical evaluation of MNR for contaminated sediment

Develop case histories to assess the effectiveness of Sediment-MNR as a risk- management alternative to reduce risk to human health and the environment.

Weight-of-evidence approach for assessing effectiveness of MNR for contaminated sediments

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Second International Conference on Remediation of Contaminated Sediments, Venice, Italy

Framework for Evaluating the Effectiveness of Monitored Natural Recovery (MNR) as a Contaminated Sediment Management Option

5 presentation with associated manuscripts to be published in the conference proceedings

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Second International Conference on Remediation of Contaminated Sediments, Venice, Italy

1. Framework for Evaluating the Effectiveness of Monitored Natural Recovery (MNR) as a Contaminated Sediment Management Option.

2. Sediment Stability Assessment to Evaluate Natural Recovery as a Viable Long-Term Remedy for Contaminated Sediment Sites.

3. Characterization of Fate and Transport Processes: Comparing Contaminant Recovery with Biological Endpoint Trends.

4. Natural Recovery: Monitoring Declines in Sediment Chemical Concentrations and Biological Endpoints.

5. Numerical Models as Tools to Allow Prediction of Monitored Natural Recovery (MNR).

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MNR Framework Five Assessment Elements

Monitored Natural Recovery Evaluation

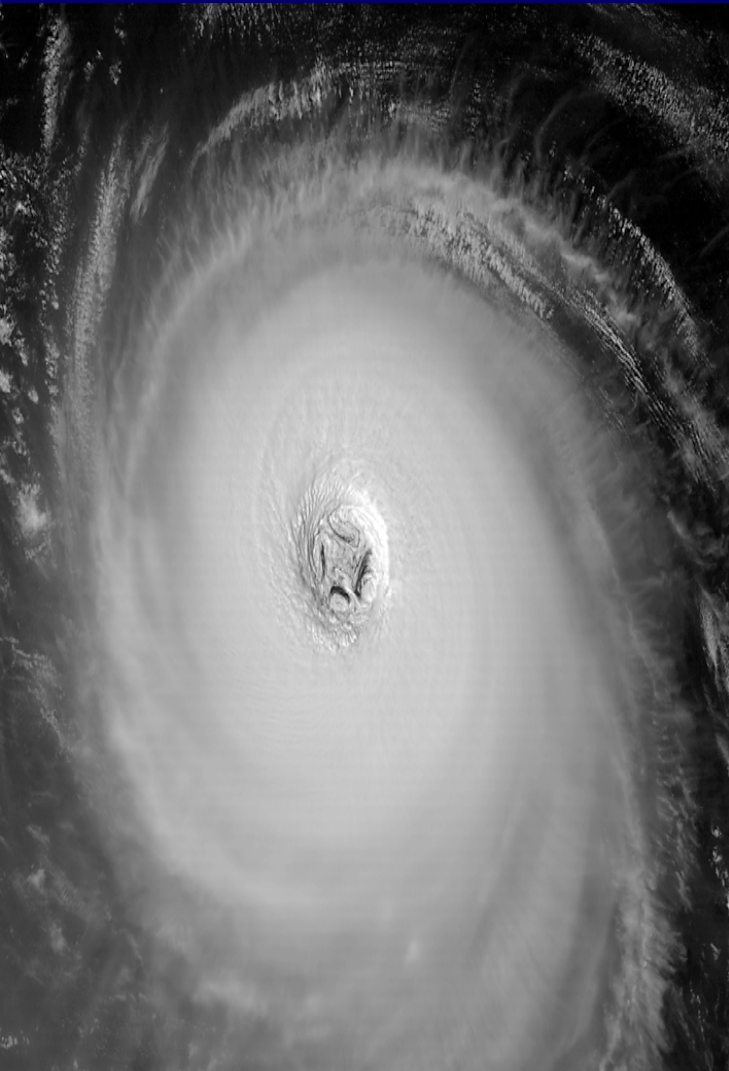| Source Control	Fate & Transport	Contaminant Trends	Biological Endpoints	Predictive Tools
I	II	III	IV	V

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I. Characterization of Historical Sources and Controls

- External Sources
  - Outfalls/non-point

- Internal Sources
  - Release from legacy sediments (hot spots)

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II. *Characterization of Fate & Transport Processes*

Sediment

-Water & Solid Based Processes
-Geomorphic Assessments
-Long Term Stability (extreme events)

Chemical

- Fate, Mobility, Availability(bio)
- Spatial/Temporal Distribution

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III. Historical Record of Contaminant in Sediments

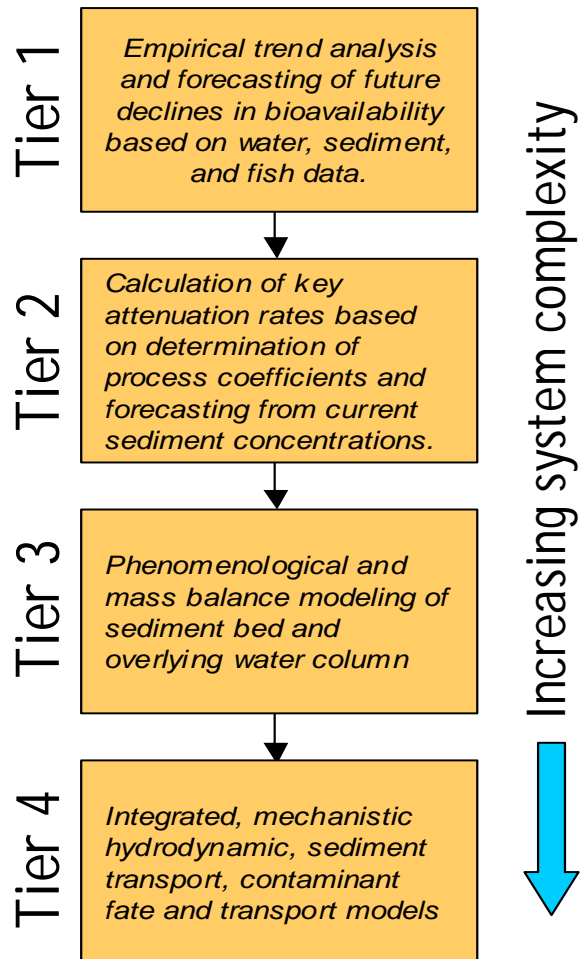*Evaluate reduction in chemical exposure using temporal trends in sediment chemical data*

- Past Sampling Events

- Sediment Cores
  - Vertical contaminant profile
  - Radio-geochemistry dating (e.g., ^{7}Be, ^{210}Pb , ^{137}Cs)
  - Accumulation of clean sediments

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V. Trends in Biological Endpoints

Trend analysis of relevant biological endpoints

- Corroborate risk reduction & biological recovery

- Biological endpoints
    - Tissue analysis
    - Sediment bioassay
    - Histopathology
    - Community analysis/surveys

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V. Development of Predictive Tools

Tier 1: Empirical trend analysis and forecasting of future declines in bioavailability based on water, sediment, and fish data.

Tier 2: Calculation of key attenuation rates based on determination of process coefficients and forecasting from current sediment concentrations.

Tier 3: Phenomenological and mass balance modeling of sediment bed and overlying water column

Tier 4: Integrated, mechanistic hydrodynamic, sediment transport, contaminant fate and transport models

Increasing system complexity

Are observed reductions in sediment and biological risks expected to continue into the future

- Extrapolation of historical trends may not be appropriate

- Fate and transport processes driving recovery complex

- Numerical model predict long-term reductions in exposure due to processes that operate on annual/decadal scales

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Summary/Path Forward

- **Framework for evaluating MNR developed by members of the Sediment RTDF Workgroup**

  Science-based (WOE) approach includes steps such as data assessment, modeling, and site monitoring

- **Working with RTDF and Office of Superfund Remediation and Technology Innovation (OSRTI) to get additional input on the manuscripts outlining framework**

- **Post the papers on the Sediment RTDF web site**

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