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An Examination of Total and Methyl Mercury fate and transport in the Florida Everglades Using a Eulerian Approach

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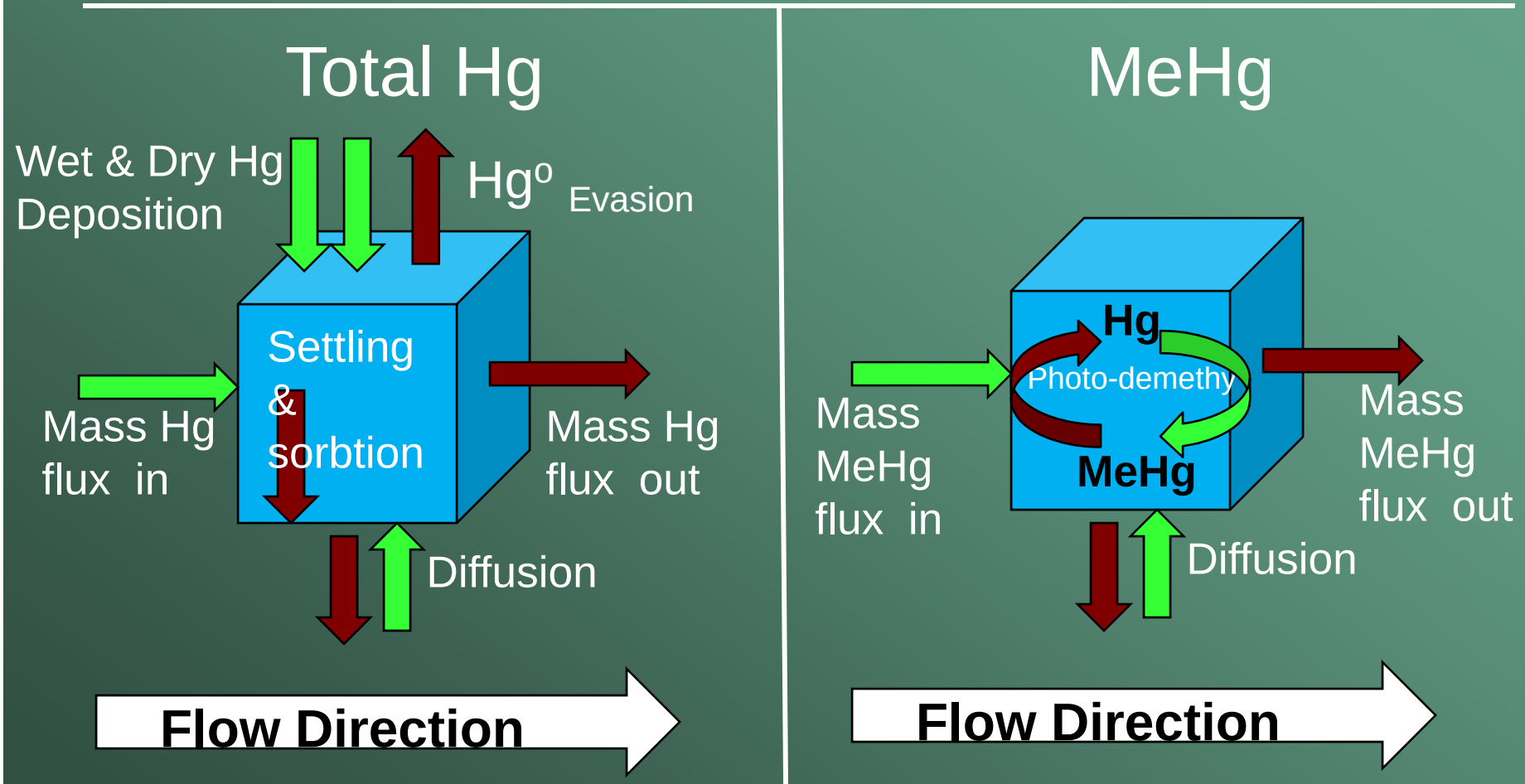
U.S. Department of the Interior
U.S. Geological Survey

An Eulerian approach provides a significant challenge to demonstrate a linked hydro-biogeochemical level of understanding



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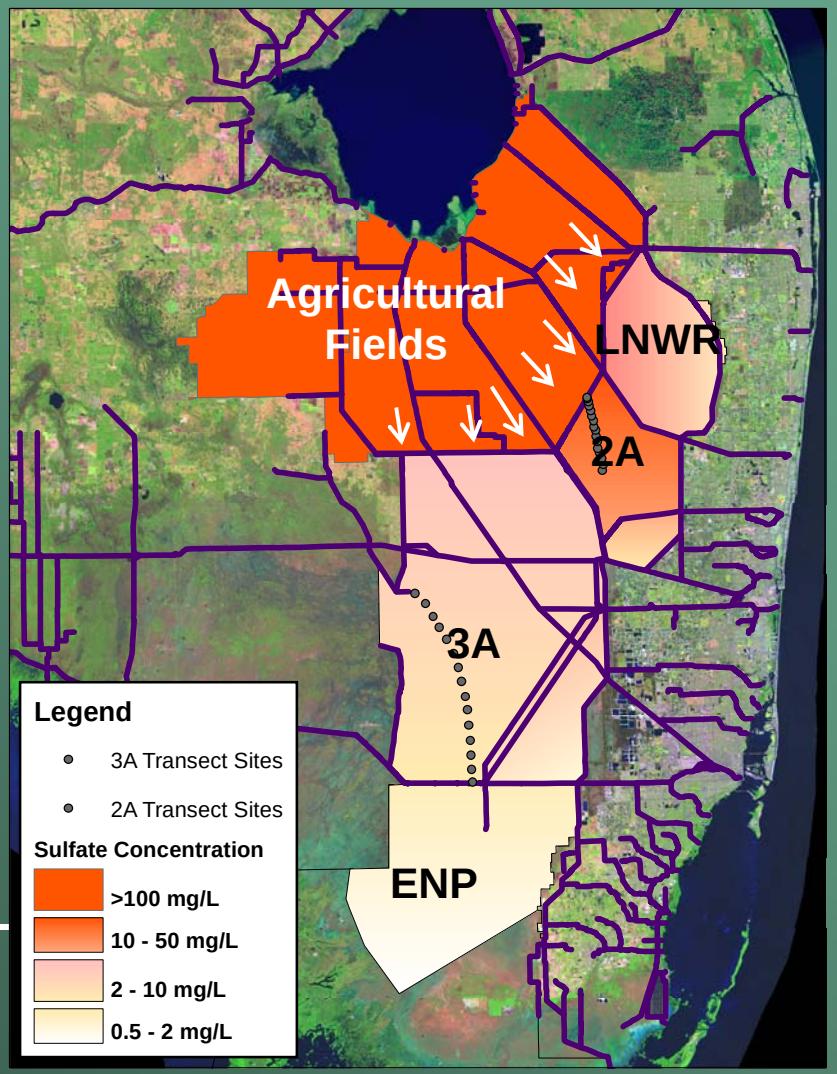
Water Quality Gradients along Flow Paths (Eulerian Approach) from Internal and External Forcing Factors

- At the top of the system, runoff from agricultural fields is enriched in several OW constituents, notably sulfate and DOC for Hg research
- A-
- document changes
- Check observations against modeled results for verification

DOC Gradient (mg/L)

N → S



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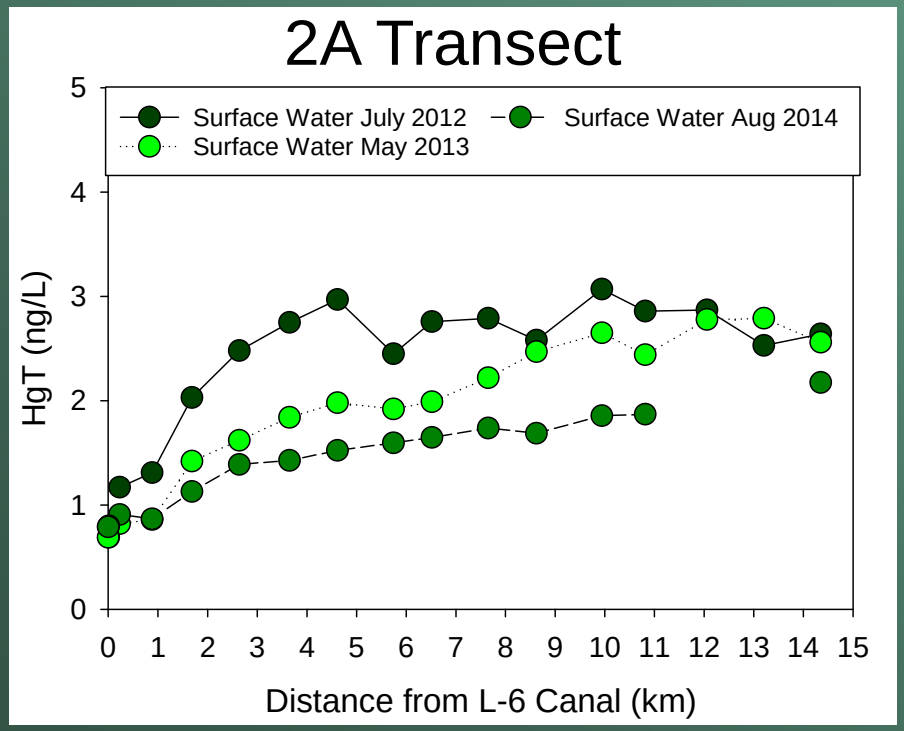
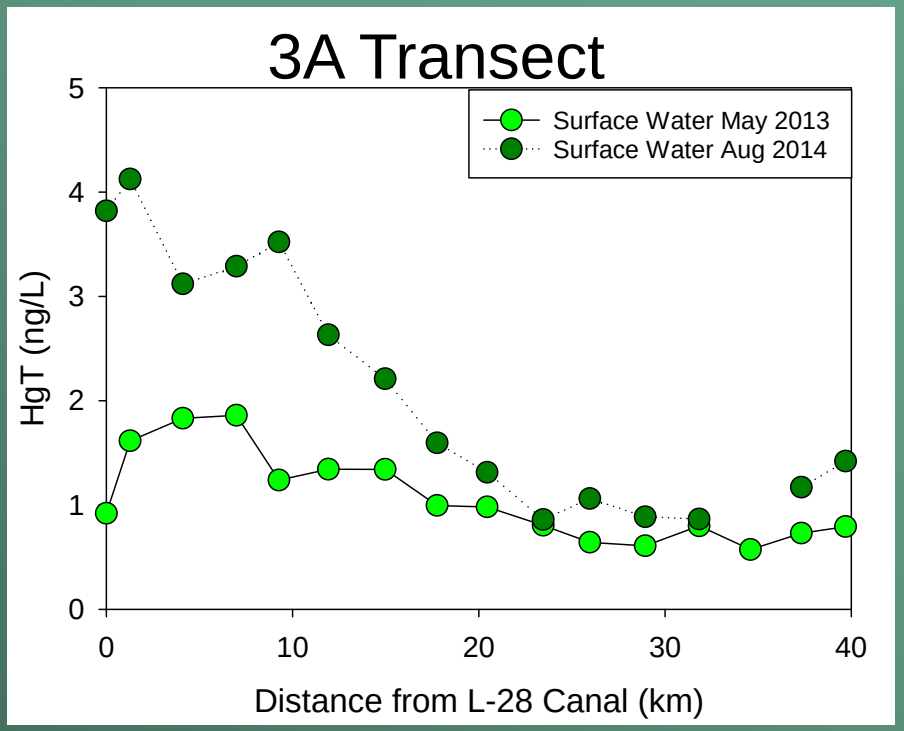
Total Hg Concentrations in Surface Water





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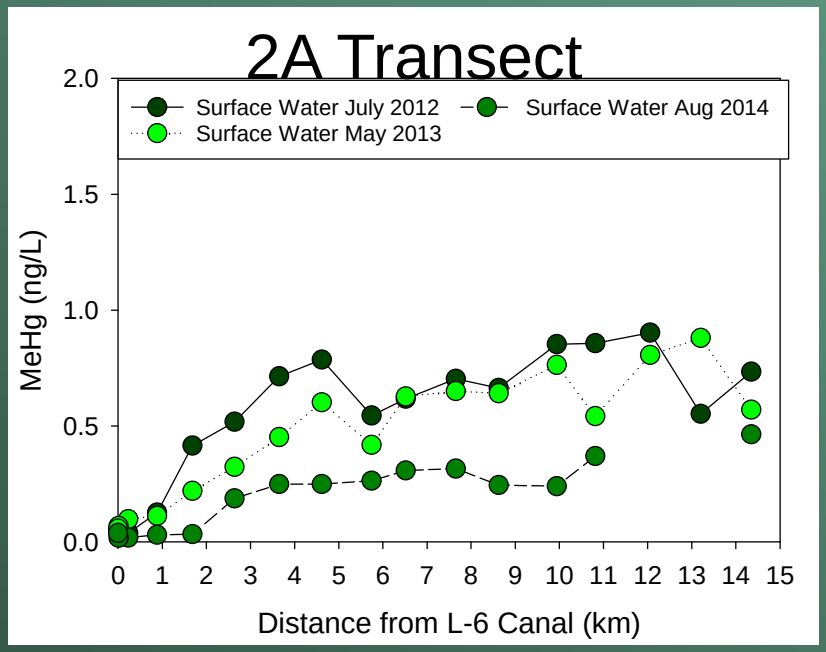
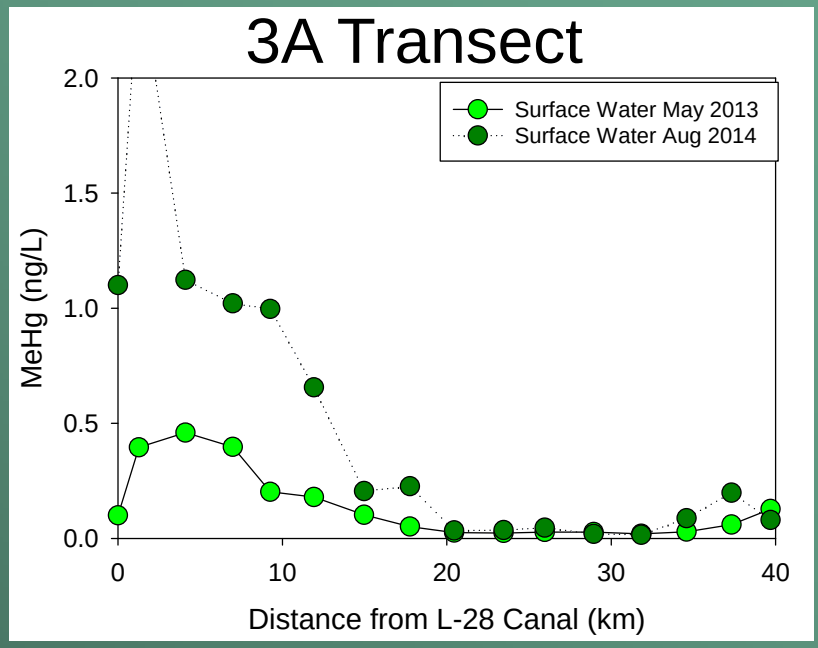
MeHg Concentrations in Surface Water





- **2A Transect**
  - Canal Surface water is initially low in meHg.
  - MeHg reaches maximum 3-5km from canal
  - MeHg porewater concentrations are generally low and only show modest increase downstream.
- **3A Transect**
  - Maximum meHg concentration is observed within the first 2-3km from the canal
  - MeHg decreases toward the center of the marsh.
  - Near the S-12, meHg marginally increases .

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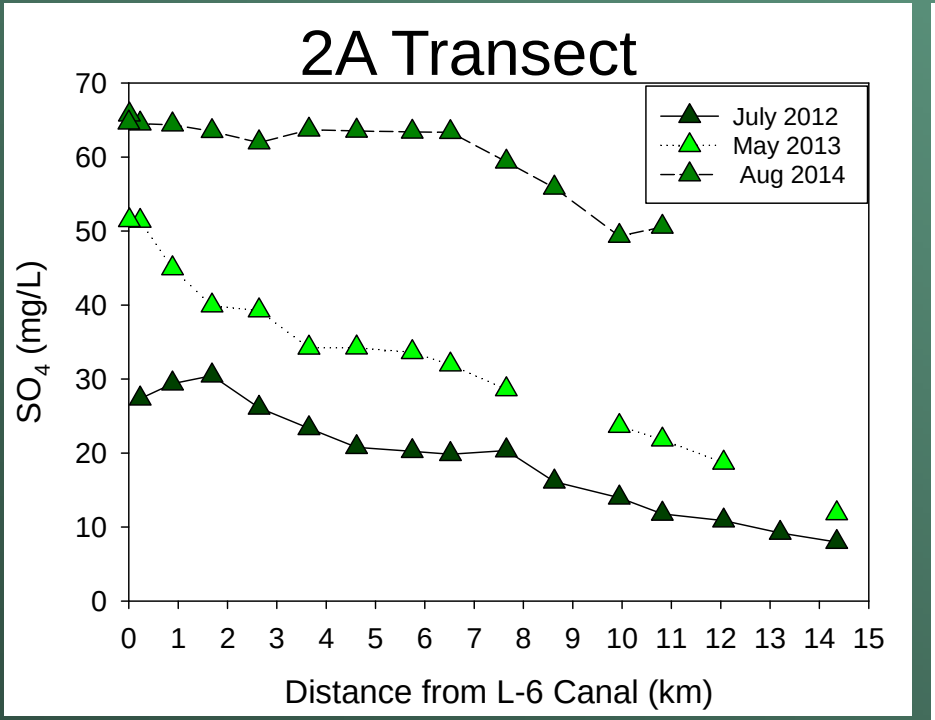
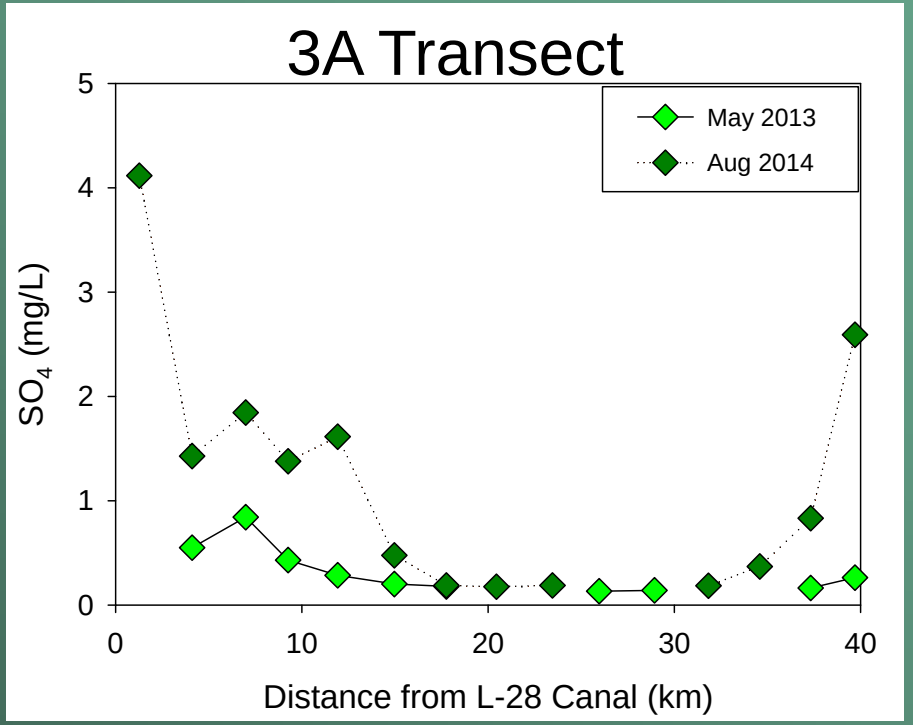
Is there a link between MeHg transect trend and Sulfate – Yes!





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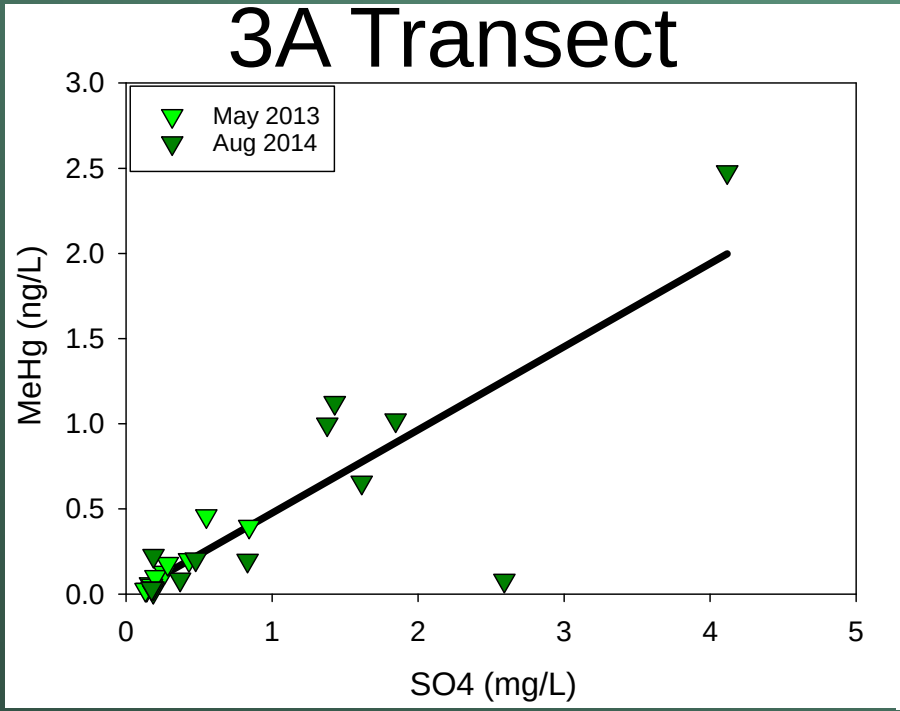
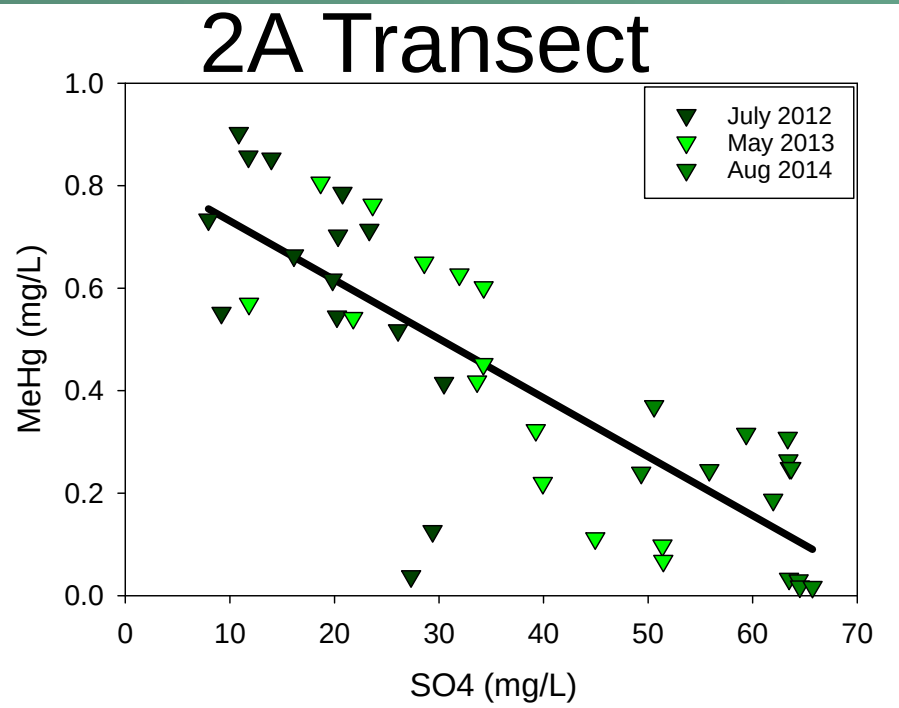
MeHg vs. Sulfate in Surface Water





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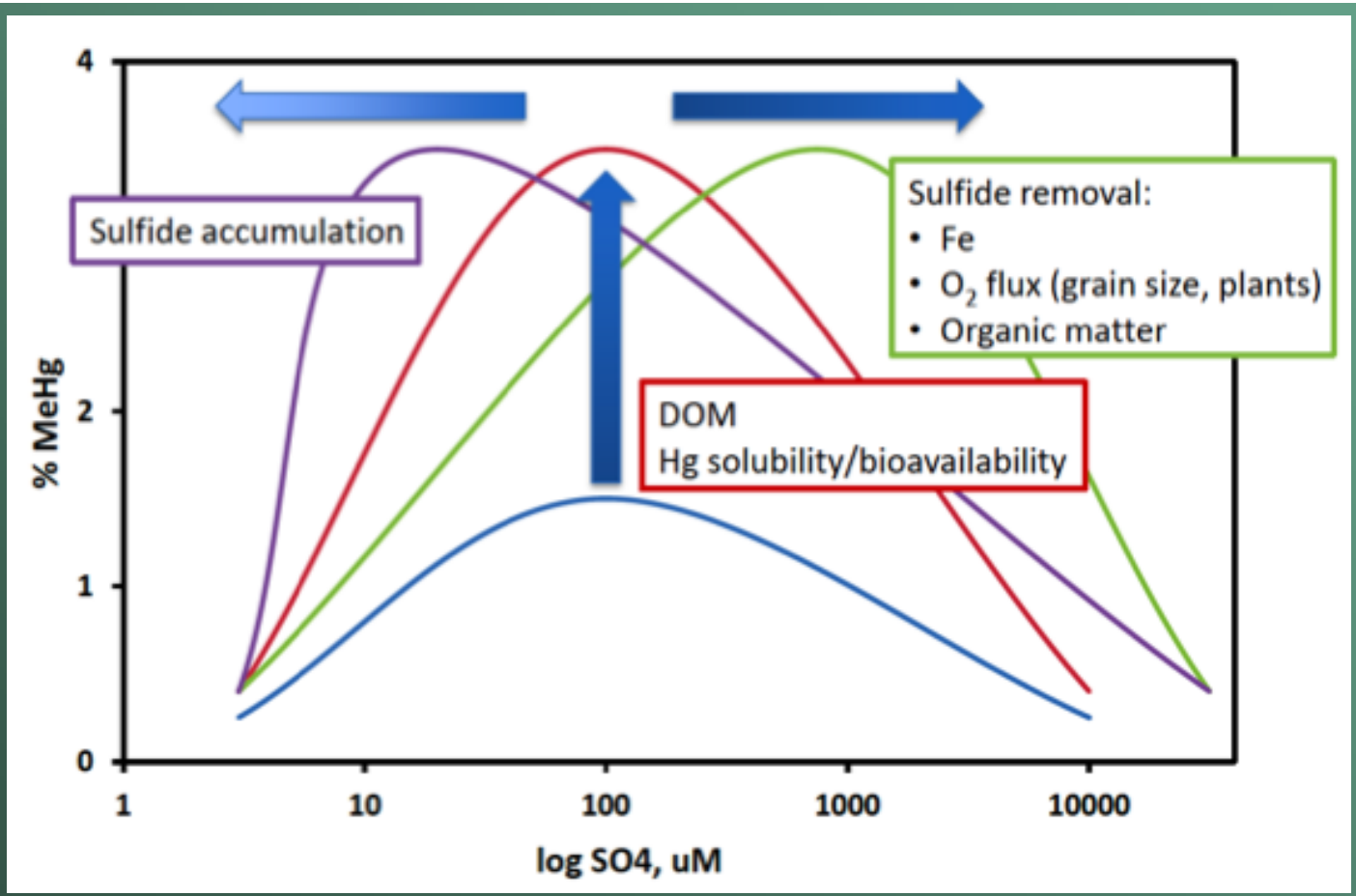
Goldilocks Distribution

Relationship between MeHg, SO_4 and DOC



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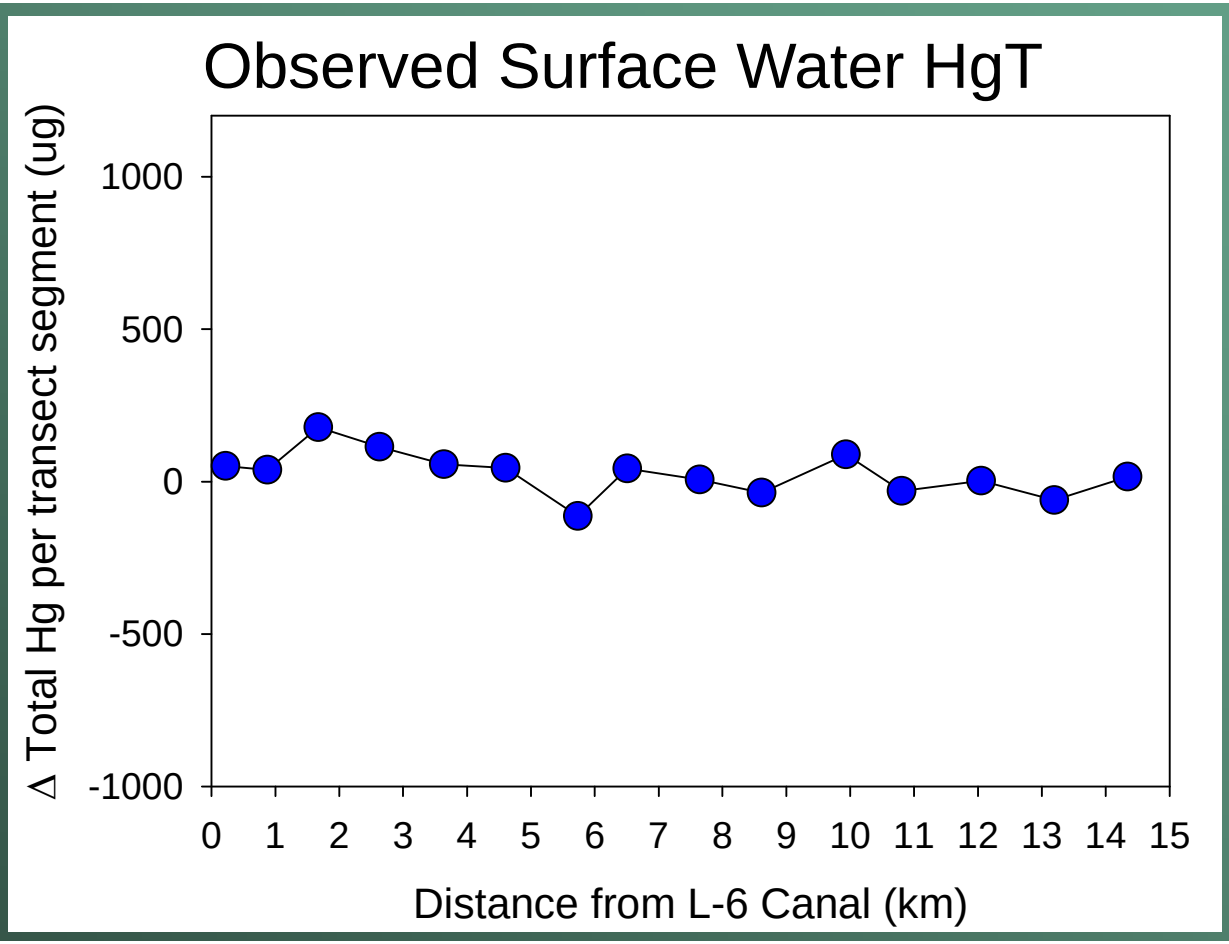
Model Results for HgT in WCA 2A



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Observed Surface Water Hg
Wet Deposition
Dry Deposition
Hg Re-emission
Gross Atmospheric Deposition
Net Atmospheric Deposition
Adsoption to Surfaces
Predicted Surface Water Hg

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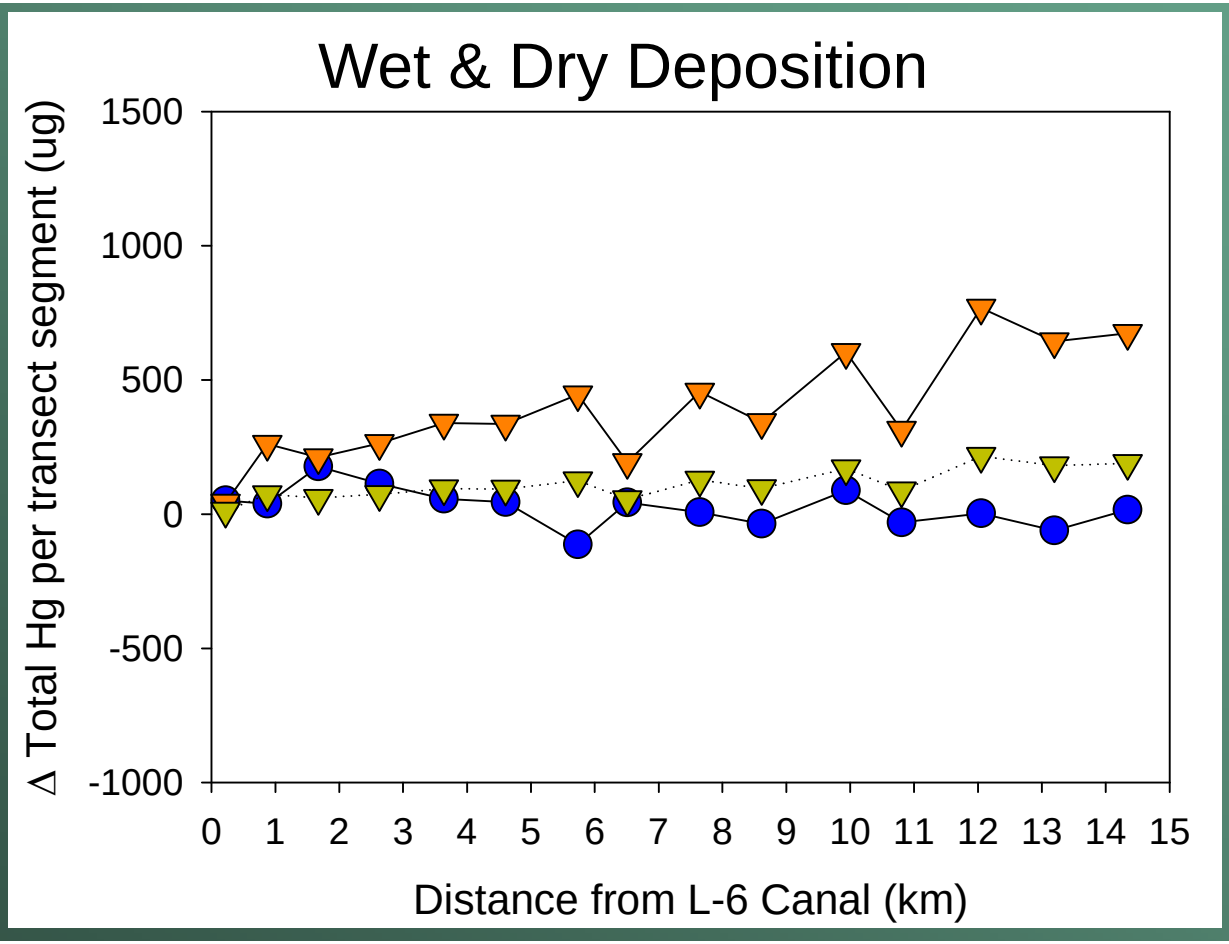

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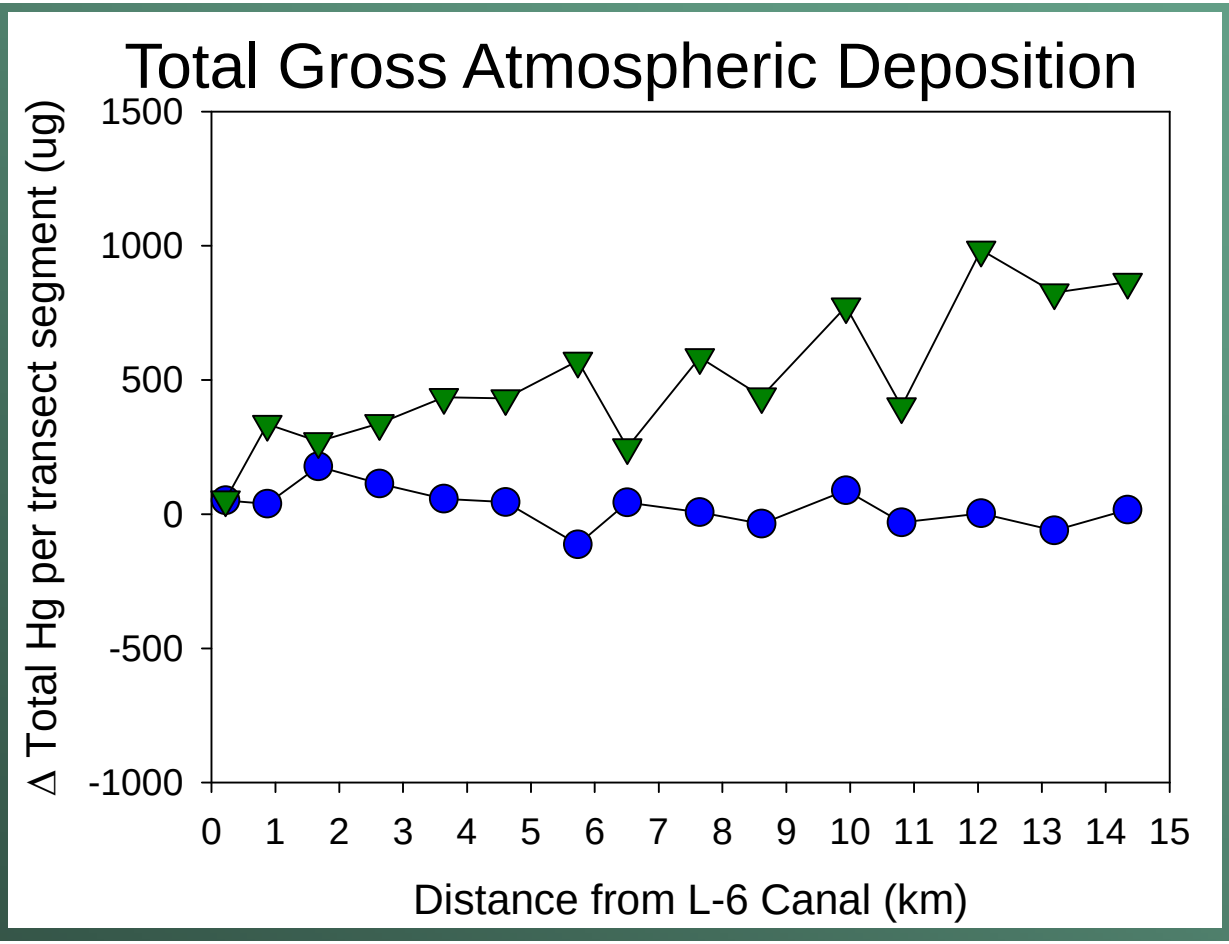

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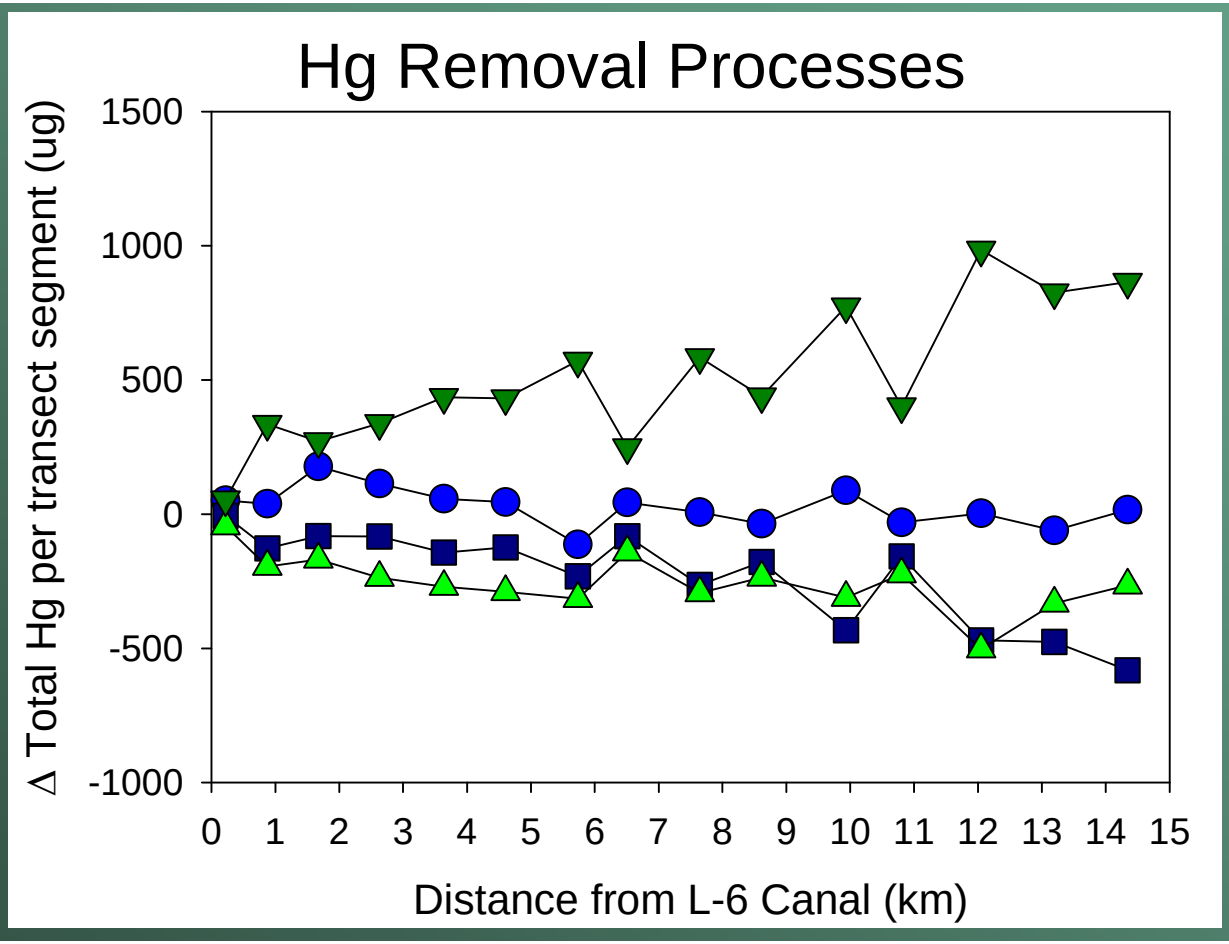

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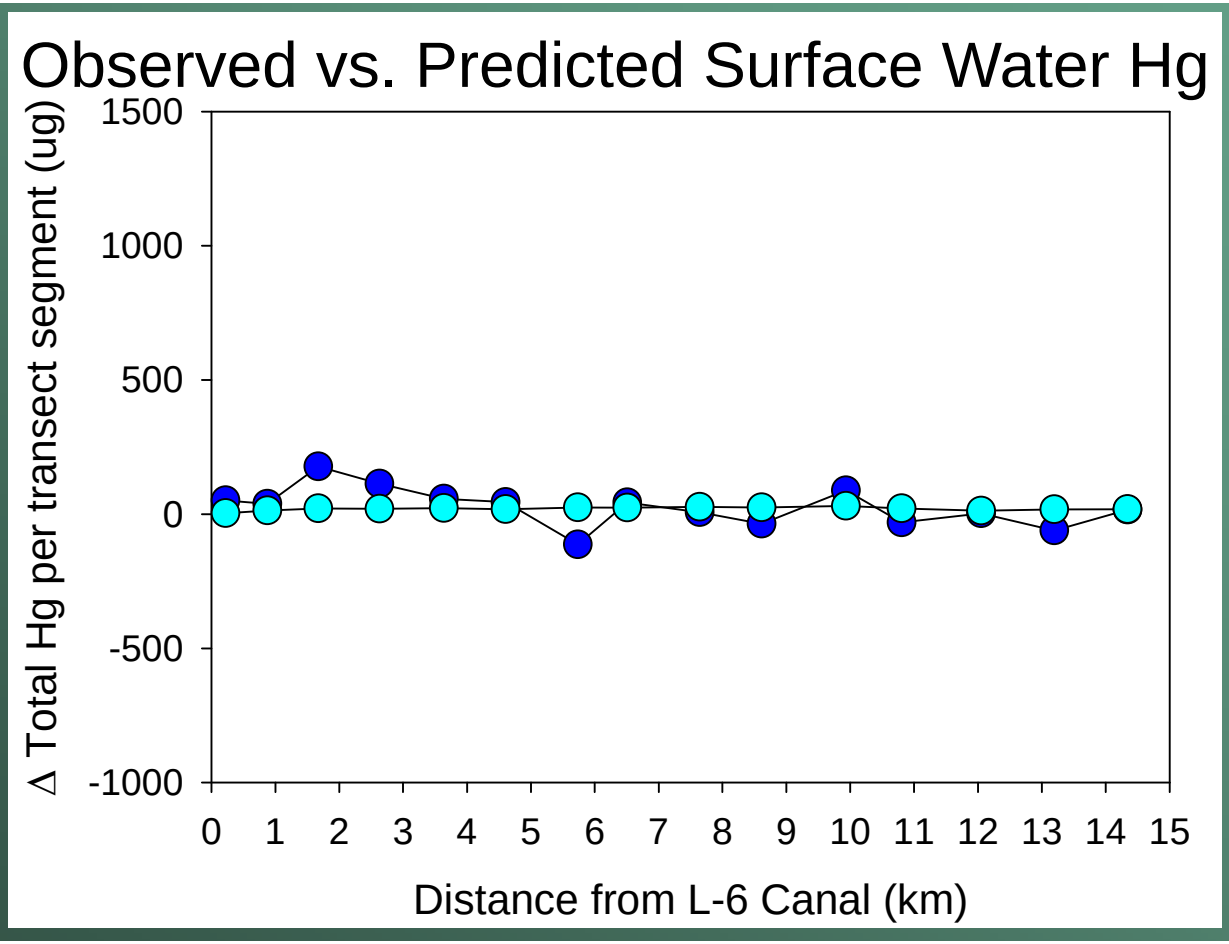

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Summary:

- Use of an Eulerian sampling approach has provided new and confirmation insights into Hg cycling processes in the Everglades
- Coupling spatial and temporal information with field measurements links our physical and process-based understanding of Hg cycling in the Everglades.
- A restored Everglades with enhanced sheet-flow (DECOMP), studies employing Eulerian frameworks will have application for forecasting future conditions.

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