



U.S. ARMY

TEMPORAL AND SPATIAL SCALES OF SEDIMENT TRANSPORT PATHWAYS FOR SANDY BARRIER TIDAL INLETS *APPLICATION OF SEDIMENT TRACKING WITH THE COASTAL MODELING SYSTEM*



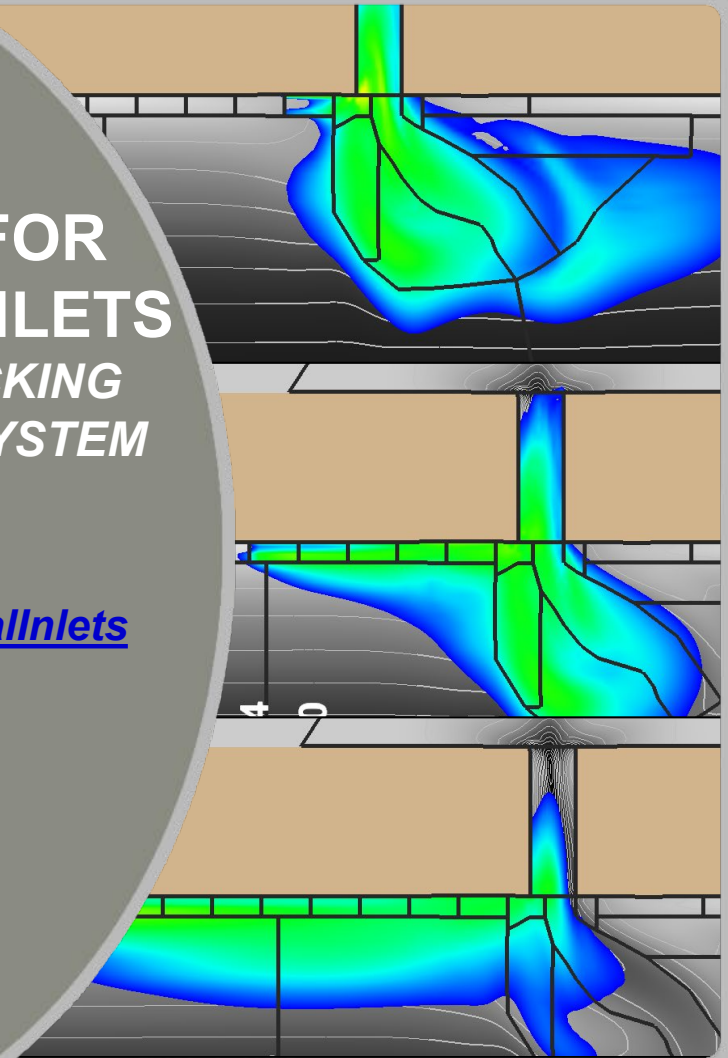
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Ping Wang

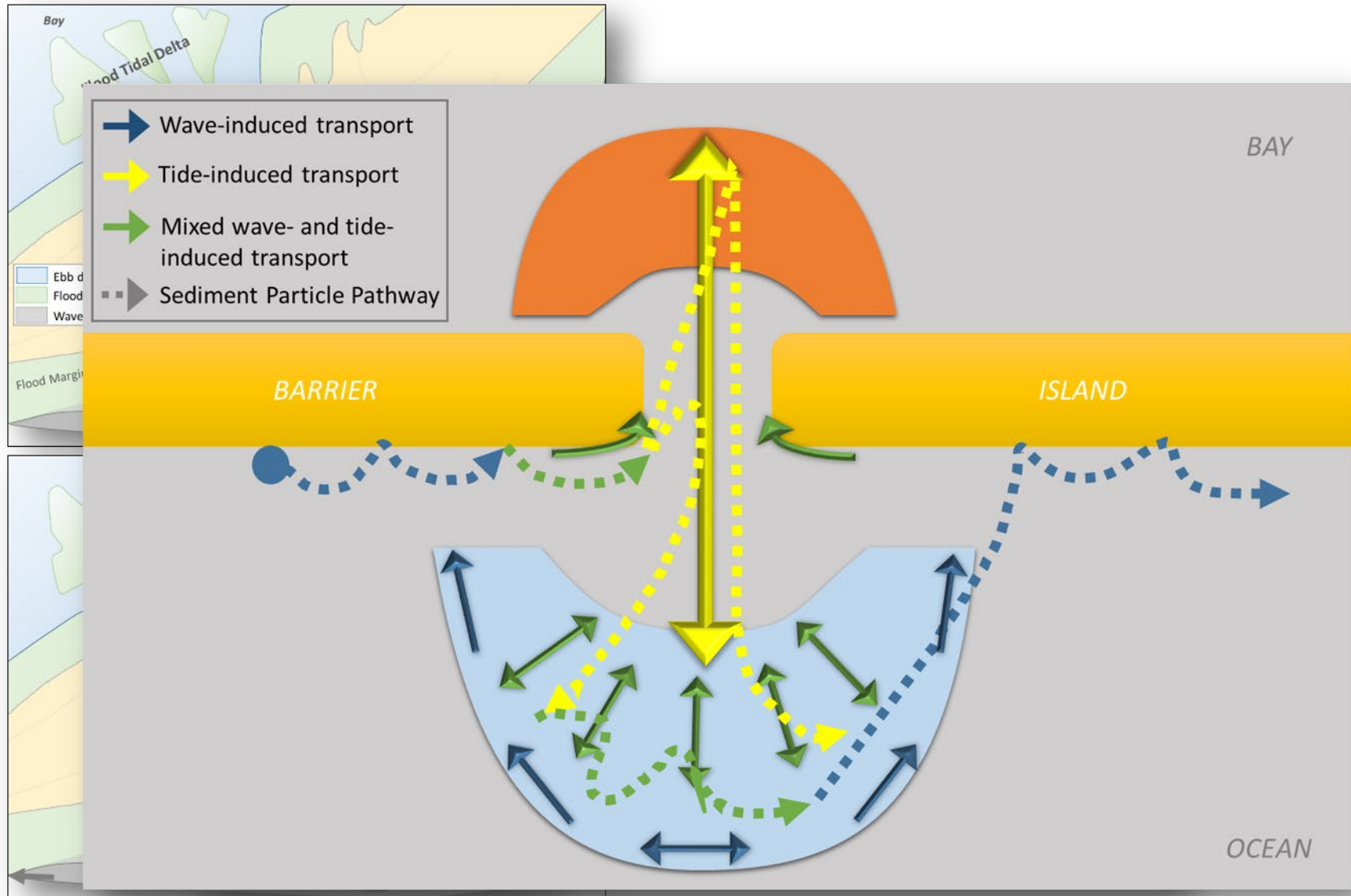
*Coastal Research Lab**University of South Florida*

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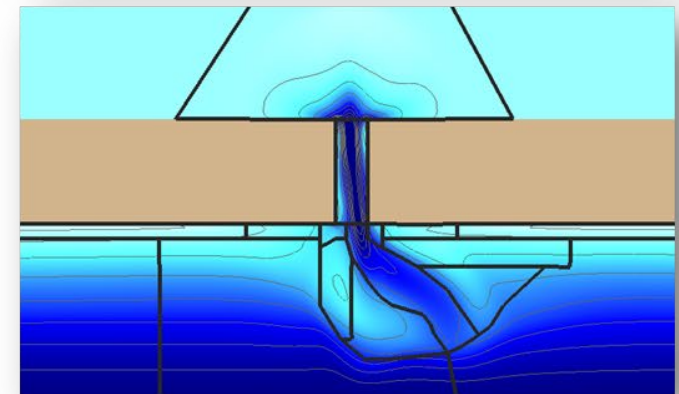
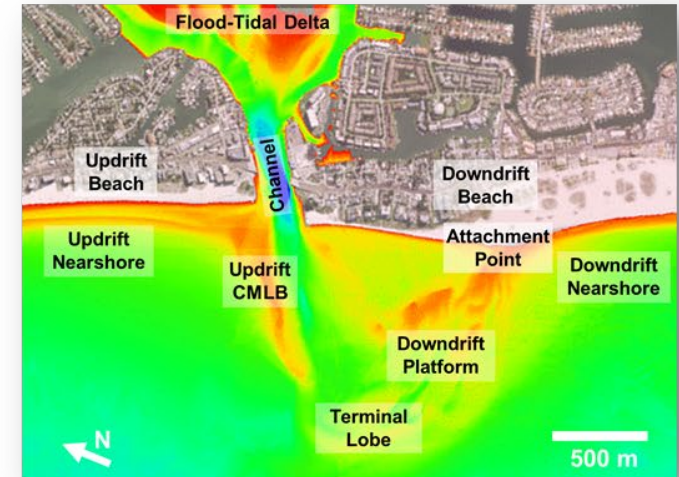
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Sand Bypassing at Tidal Inlets



Outline

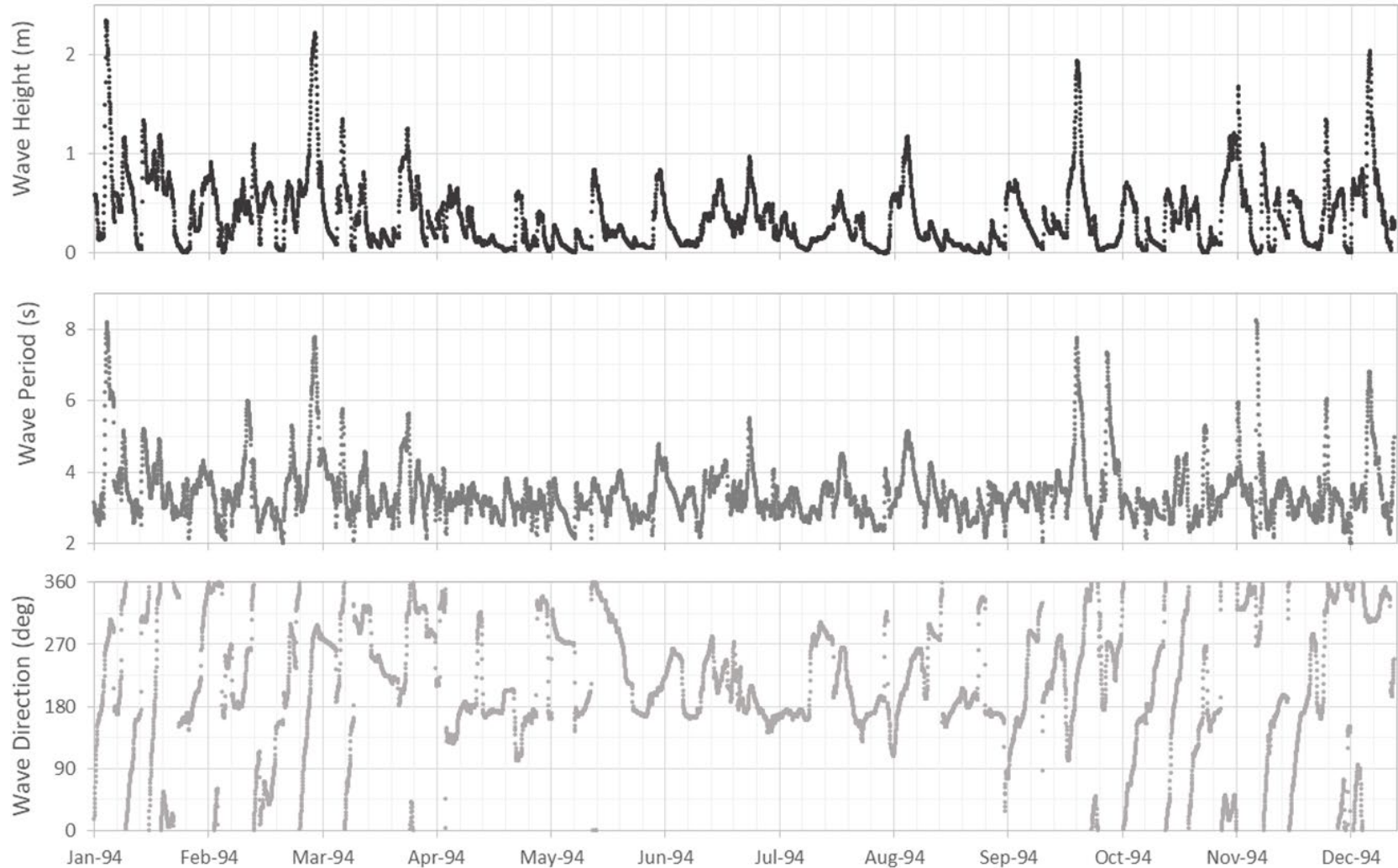
- ☐ Sand Bypassing Review
- ☐ Methods: Idealized Inlet
- ☐ Sediment Exchange Between Beach and Inlet
- ☐ Sediment Exchange Between Morphological Features
- ☐ Summary



(Styles et al. 2016)

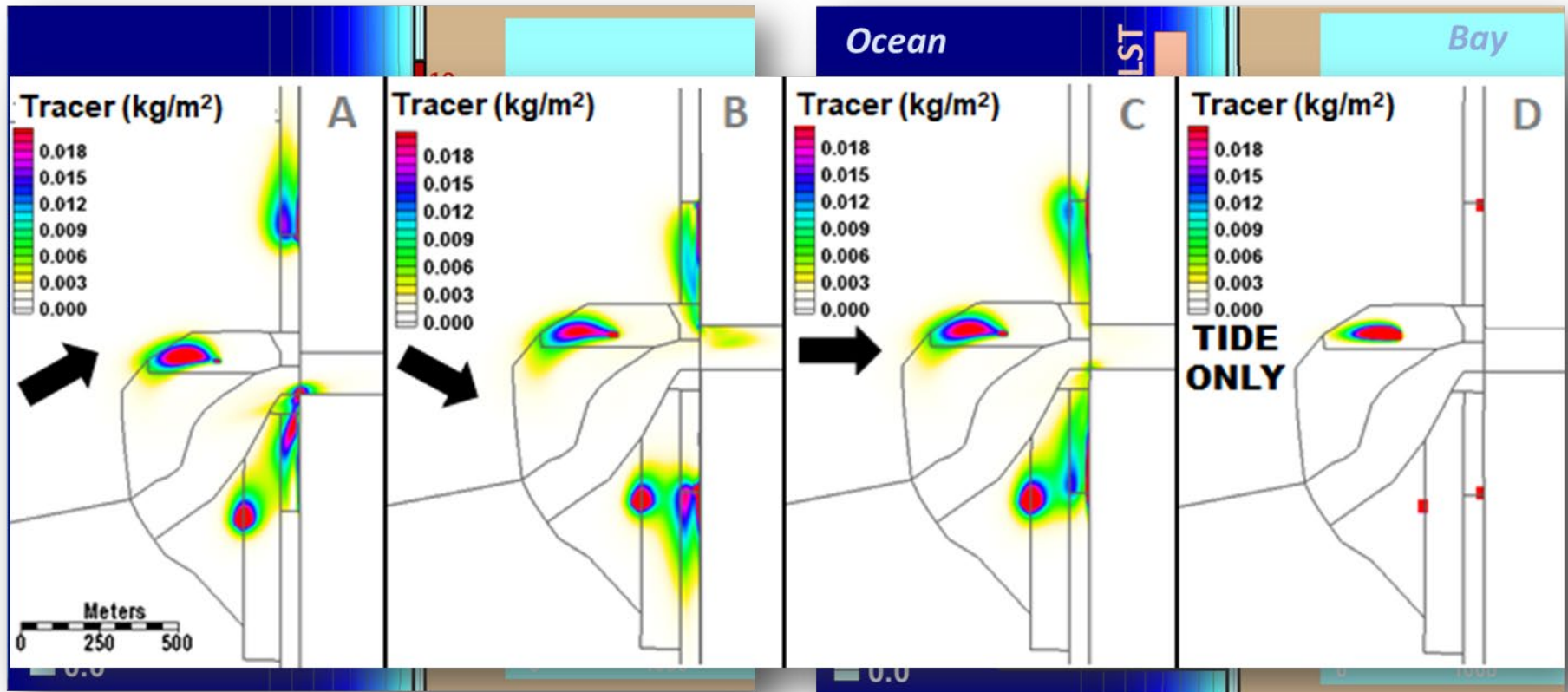
Methods

Coastal Modeling System



Methods

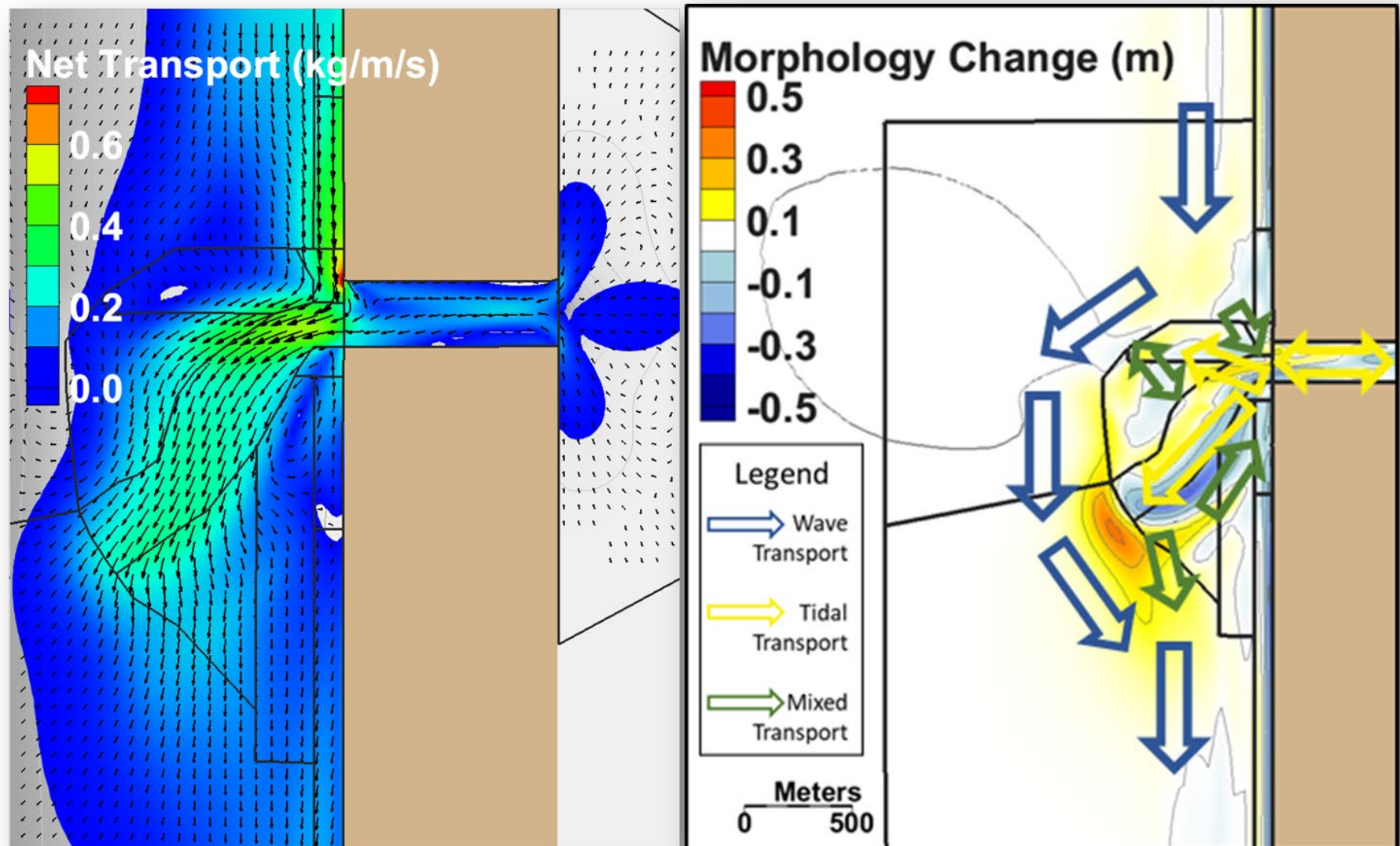
Idealized Tidal Inlet



(Styles et al. 2016)

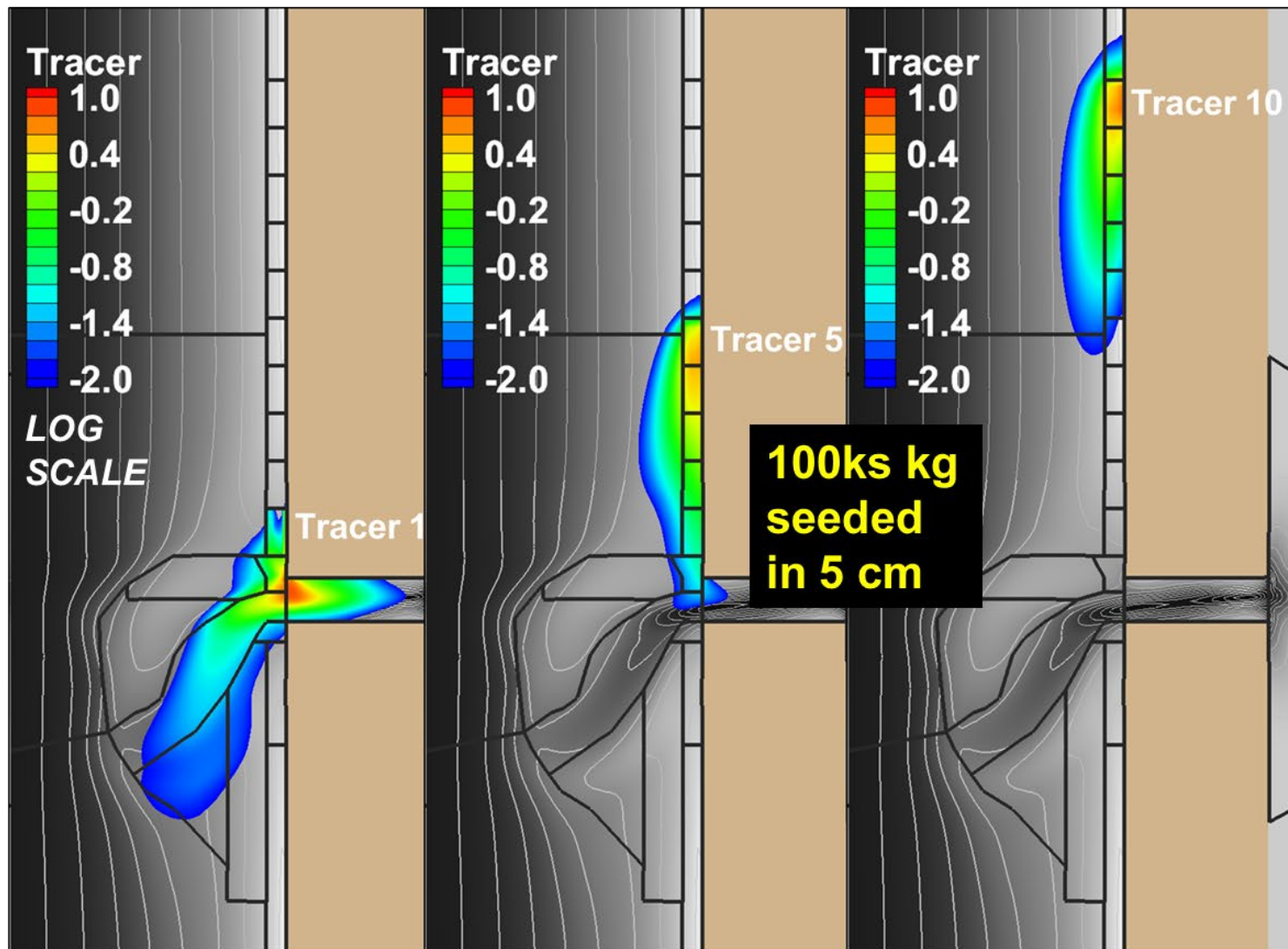
Sediment Exchange

Net Sediment Transport and Morphology Patterns



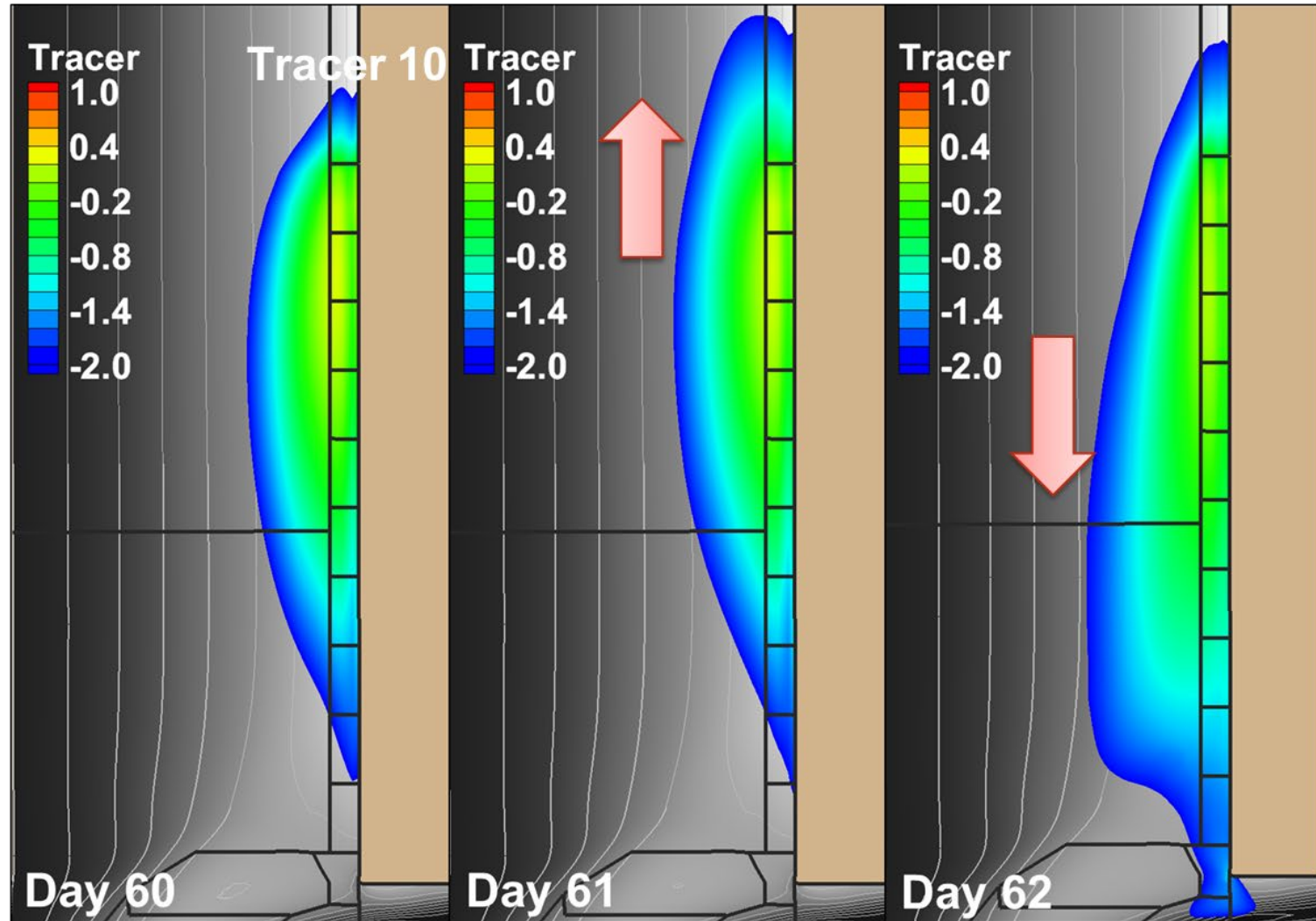
Sediment Exchange - Beach and Inlet

Mobility under storms (Day 4)



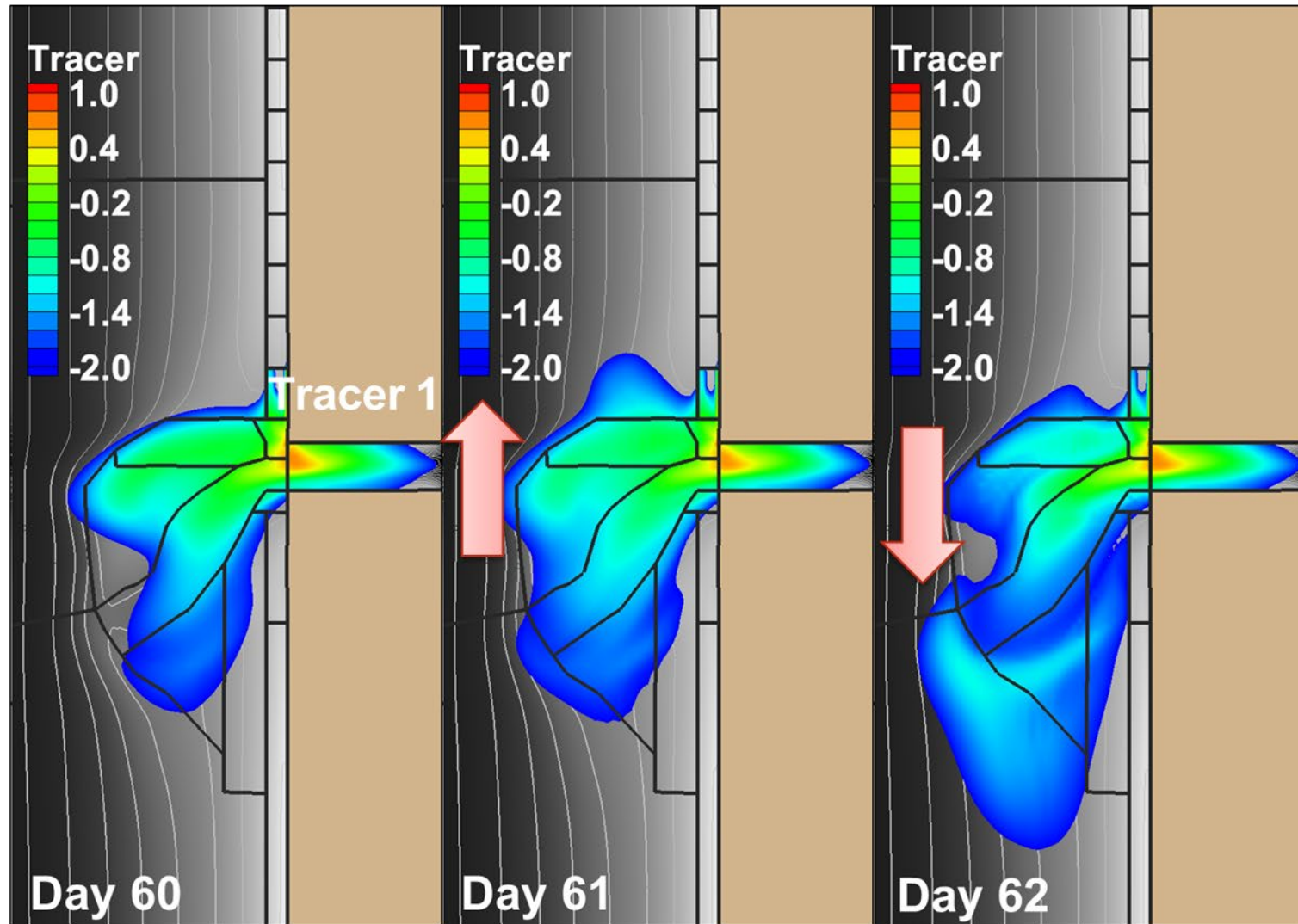
Sediment Exchange - Beach and Inlet

Mobility under storms (Day 60-62)



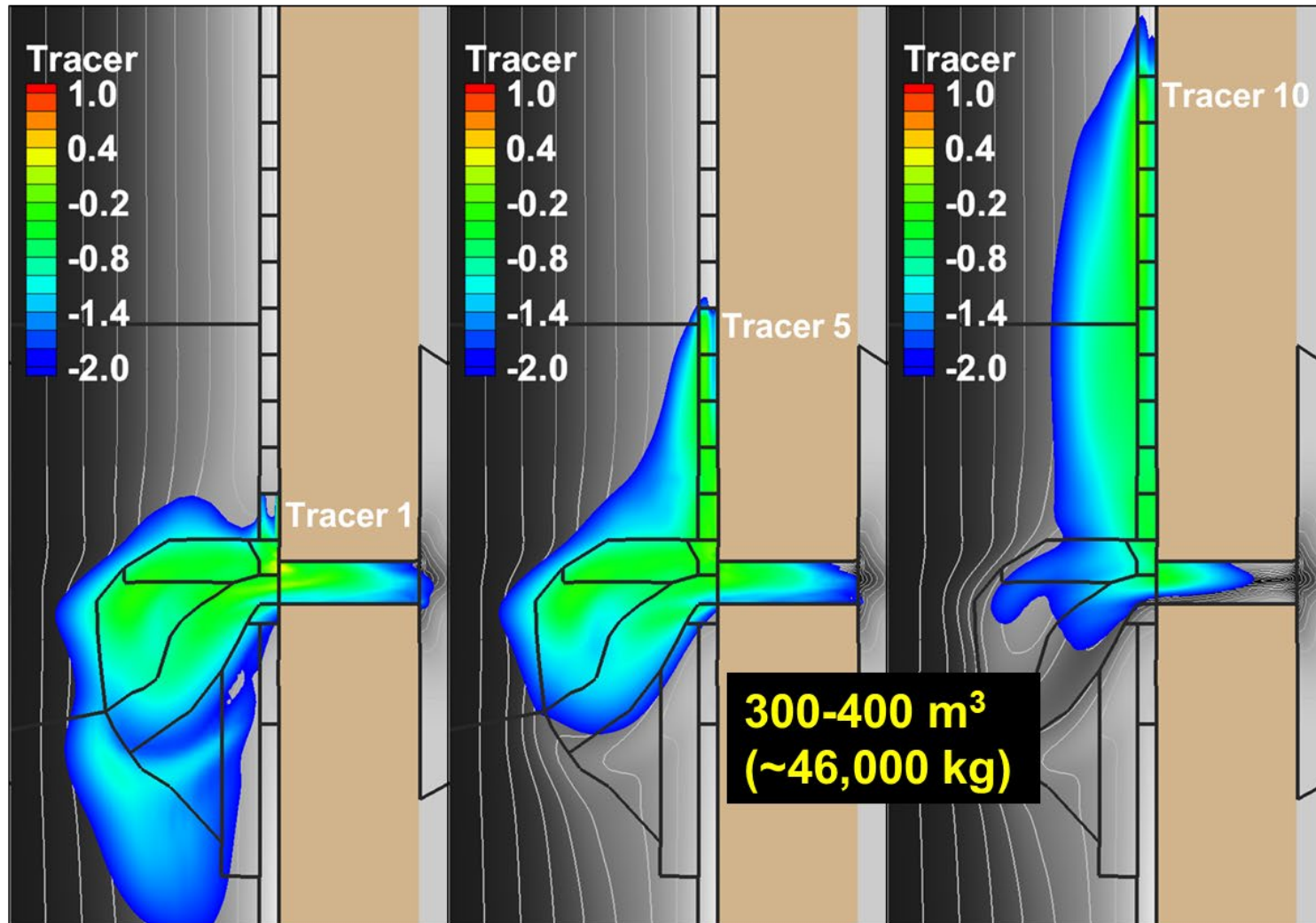
Sediment Exchange - Beach and Inlet

Mobility under storms (Day 60-62)



Sediment Exchange - Beach and Inlet

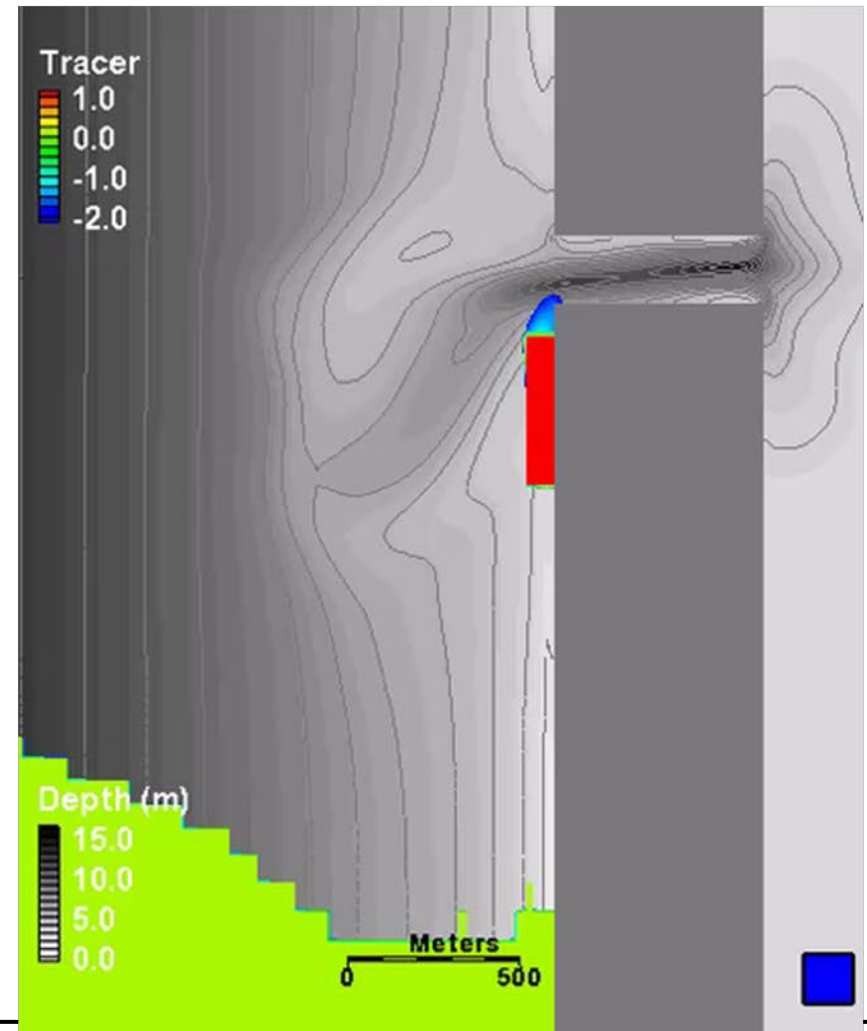
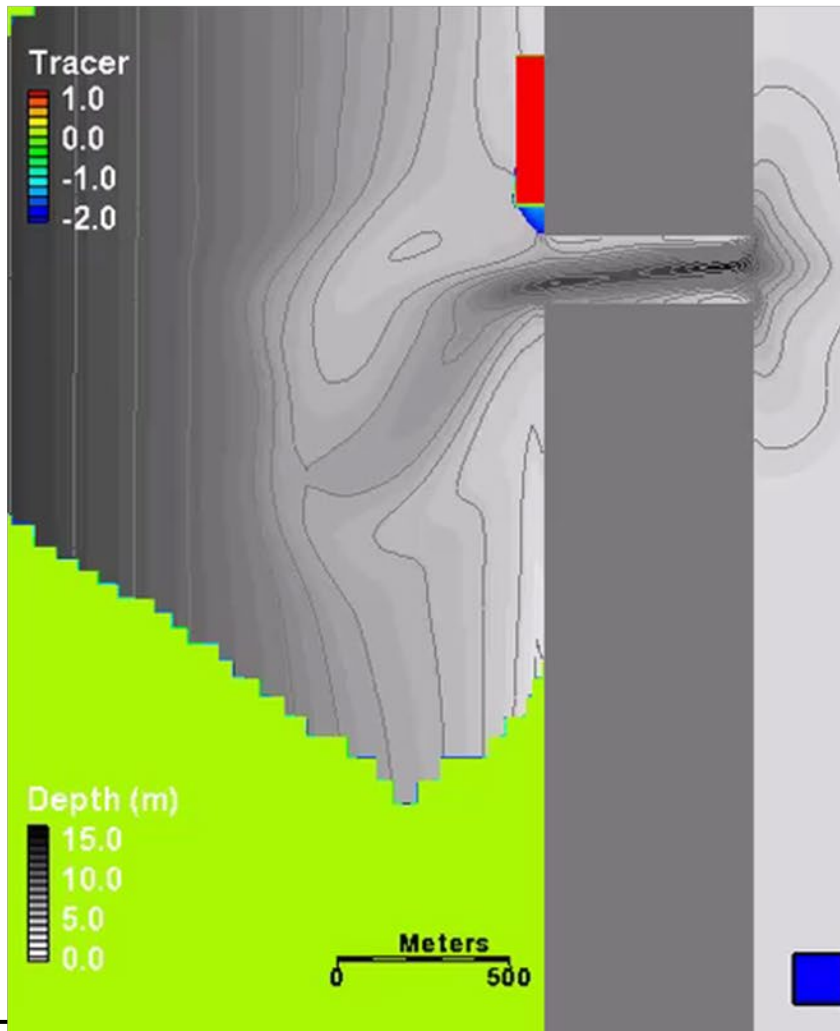
Extent of transport - One Year



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Sediment Exchange – Morphologic Features

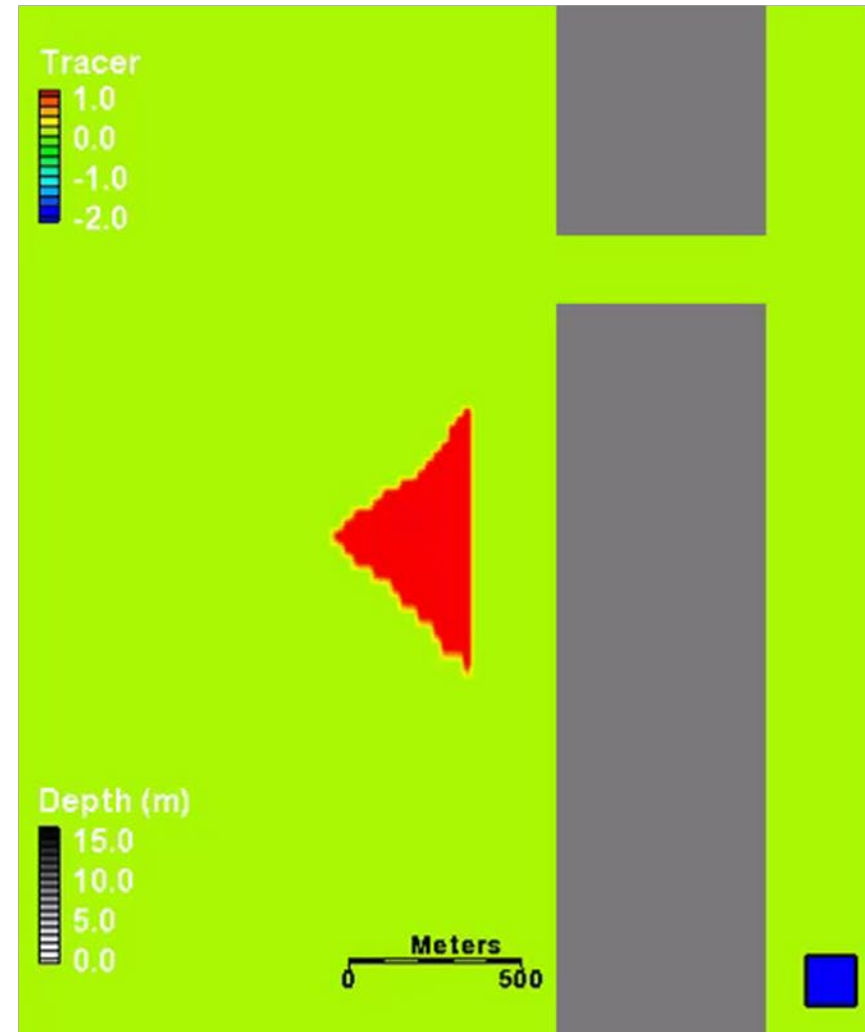
Updrift & Downdrift



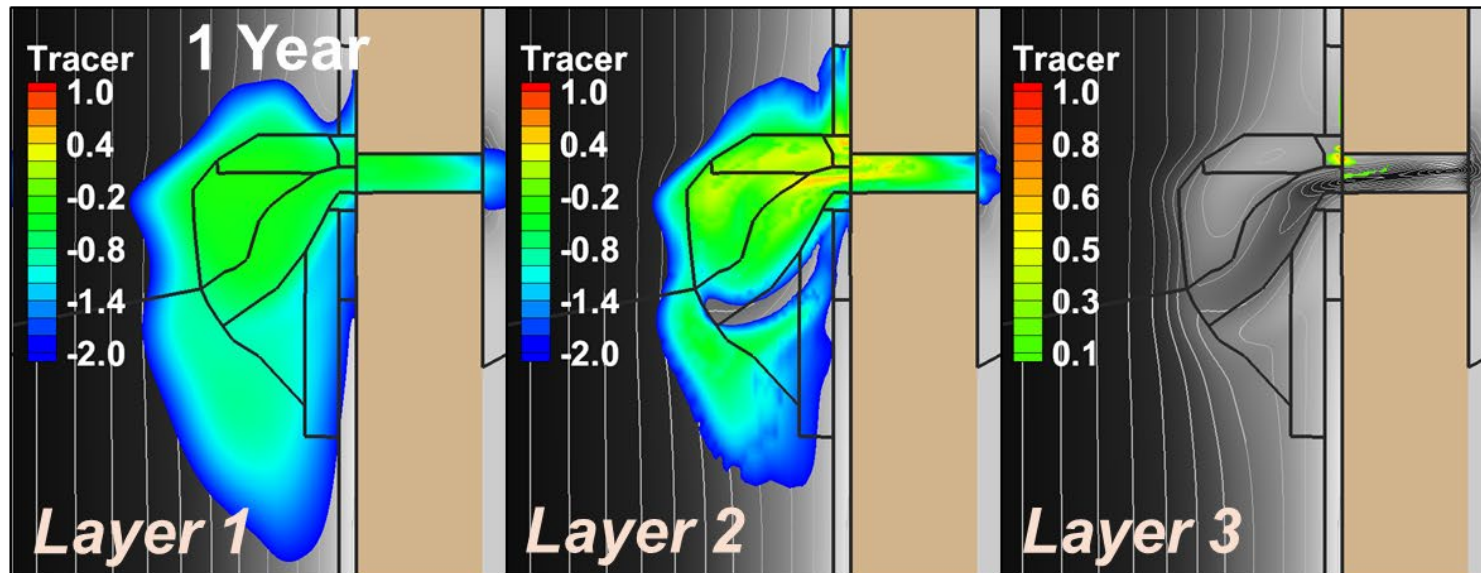
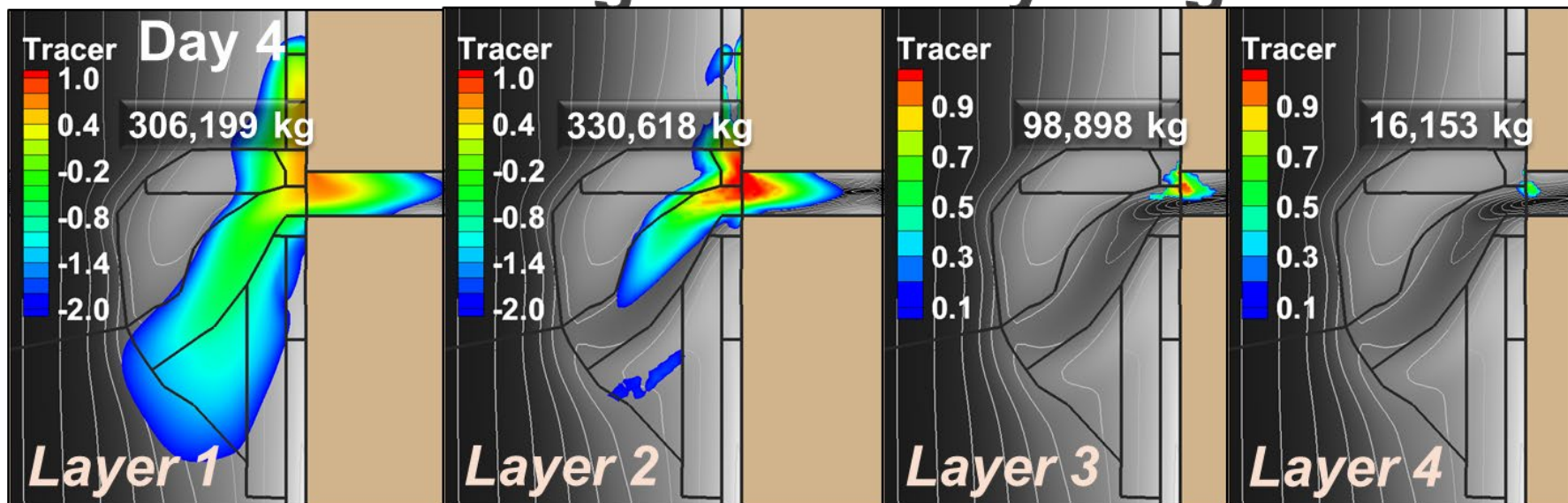
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Sediment Exchange – Morphologic Features

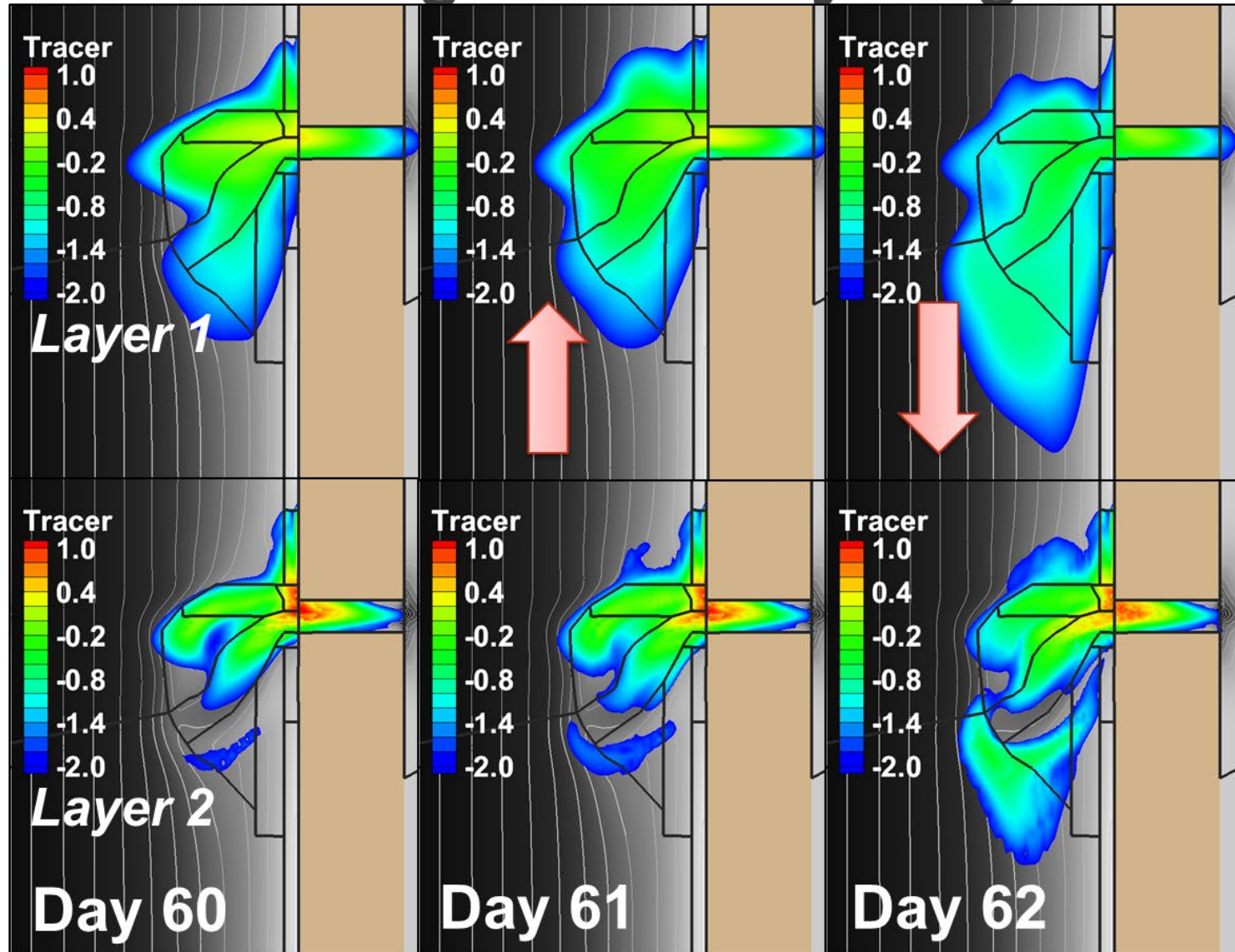
Updrift & Downdrift



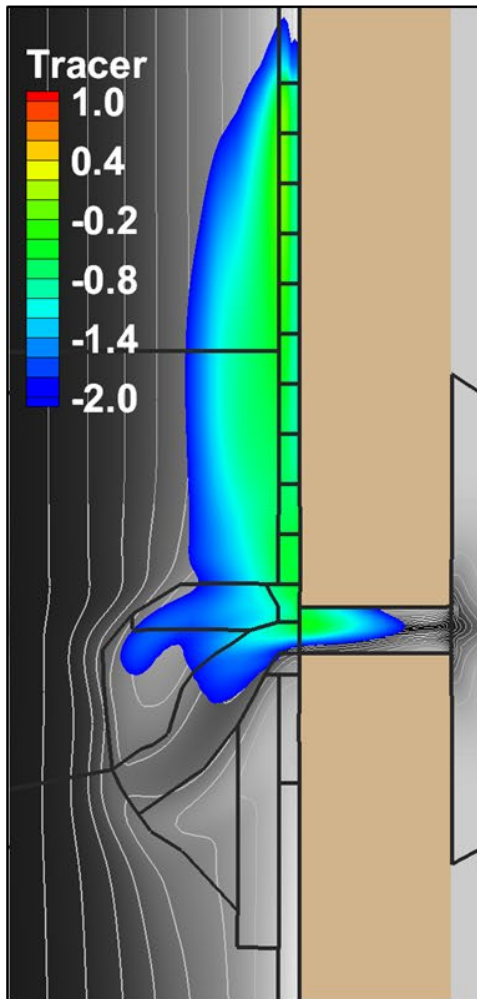
Sediment Exchange – Bed Layering



Sediment Exchange – Bed Layering



Conclusions



- ❑ Energetic wave events dominate the temporal control on sediment exchange between beach and inlet, whereas cyclic tidal processes dominate the spatial pattern of exchange between the shoals and channel
- ❑ The computed migration rate of seeded tracers along the beach was approximately 1-2 km per year
- ❑ Bed layer analysis identified
 - ❑ Shoaling zones in deeper water are linked to common bypassing pathways such as the Updrift FMC and Main/Ebb Channels
 - ❑ Zones capable of accommodating a higher transport rate in shallow water, such as the Downtide Platform of the ebb-tidal delta under the influence of shore-normal waves
- ❑ This methodology is useful in relating specific morphologic features' contribution of sediment for inlet management scenarios of dredging, and ebb-delta mining and placement

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