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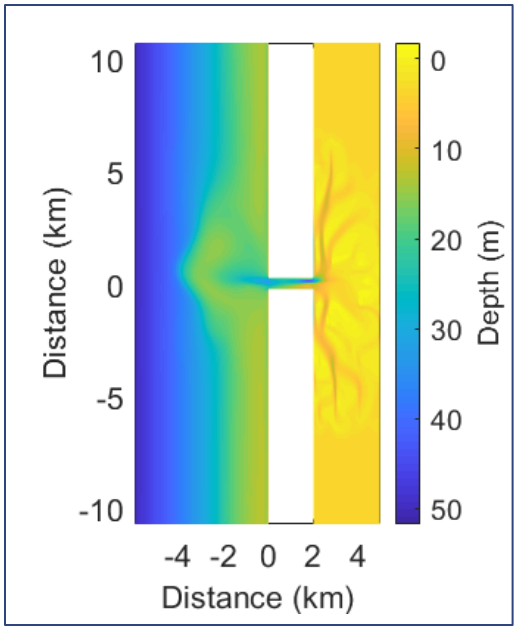
Long-term Modeling of Barrier Island Tidal Inlets



Background: Land-use change practice and relative sea-level rise in coastal areas could potentially alter the long-term hydrodynamics and sediment transport patterns near USACE navigation projects. One critical question is, "How will these transport patterns change as new sediment sources arise due to inundation or development and new flow pathways are established through changes in tide levels?" Alterations in transport can change sediment budgets, which may alter channel shoaling rates and redistribute sediment in ways that lead to increased dredging requirements.

Approach: The purpose of this work unit is to investigate how sediment budgets of the navigation channel, ebb and flood shoal deltas, and bay evolve in response to wave action, sediment availability, and bay hypsometry over the course of a century or more. Numerical simulations for a suite of bay morphologies typical of bar-built systems in the US are being conducted to determine which configurations are most likely to exasperate shoaling of navigation channels.

Technical Advancements:

- Develop new approaches to determine if changes in sediment distribution patterns near inlets (e.g., ebb shoal, flood shoal, channel dredging, placement) lead to major changes in the hydrodynamic regime (ebb versus flood dominated).
- Advance the numerical modeling strategy initiative by pioneering new research avenues in long-term simulations by establishing the methodologies and guidance that will be used for planning due to changes primarily in coastal development practices.

Payoff: This research will help USACE in planning efforts that address the effects of sea-level rise by identifying metrics that indicate whether an inlet is likely to reinforce present morphodynamic characteristics or is more likely to increase sediment deposition and channel shoaling. It will also benefit CMS users engaged in evaluating project lifecycle contingencies and planning scenarios to mitigate the effects of sea level rise.

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