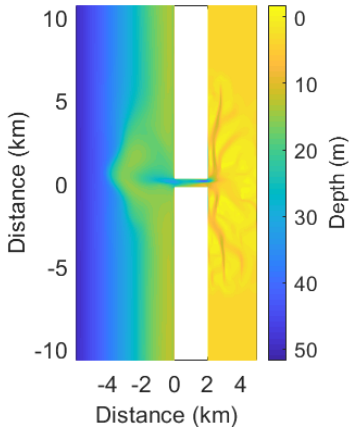
Long-term Modeling of Barrier Island Tidal Inlets (FY20)

Background:

New research pathways that can address the potential consequences of sea level rise and coastal development practices to navigation and sediment management in the context of morphology change of barrier island tidal inlet systems are increasingly necessary to predict longer term morphologic evolution spanning 50-year project lifetimes, 100 year predicted sea level changes, and other potential climatic factors. The response of sediment transport patterns to inundation and development induced sediment source changes and flow pathway changes is a critical research question. Alterations in sediment transport may alter channel shoaling rates and subsequently redistribute sediment in ways that lead to increased dredging requirements.

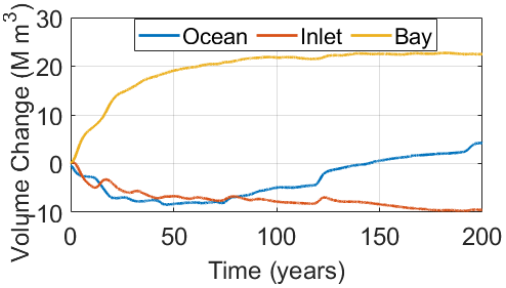


Approach:

This work investigates the century-scale evolution of navigation channels, ebb and flood shoal deltas, and bay sediment budgets in response to wave action, sediment availability, and bay hypsometry. Numerical simulations for a suite of bay morphologies typical of bar built systems in the US are being conducted to determine the factors that contribute to the importation or exportation of littoral (oceanside) sediment.

Technical Advancements:

- Develop new approaches relating sediment distribution patterns near inlets (e.g., ebb shoal, flood shoal, channel dredging, and placement) to a hydrodynamic regime (ebb versus flood dominated).
- Establishing the methodologies and guidance to pioneer new research avenues in long-term simulations and advance the numerical modeling strategy initiative.



Payoff:

The research will help USACE in planning efforts that address the effects of sea-level rise by identifying which inlets are likely to reinforce present sediment transport patterns and which inlets may show drastic changes in sediment distribution patterns. 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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