VIMS | William & Mary
Virginia Institute of Marine Science

Chincoteague Inlet Modeling Study (CIMS)

Quantifying and Predicting Changes at Chincoteague Inlet, Virginia

The region surrounding Chincoteague Inlet and adjacent Chincoteague, Assateague, and Wallops islands is a dynamic system experiencing rapid change associated with sediment redistribution (erosion and deposition) and shifting navigation channels. Understanding the rates and causes of sediment movement throughout this system is critical to developing a regional management plan and testing shoreline management strategies that are protective of the Town of Chincoteague, the Mid-Atlantic Regional Spaceport and the NASA Flight Facility on Wallops Island, and southern Assateague Island.

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Figure 1: Chincoteague Island with southern Assateague Island (far left and center) and northern Wallops Island (far right). Image © 2018 At Altitude Gallery

CIMS Model Summary

In its first two years (FY20 & FY21) the 3-year CIMS project has developed a fully functional wave, hydrodynamic, and multi-class sediment-transport numerical model of Chincoteague Inlet and adjacent barrier islands (Figure 1).

The model extends for 120 km alongshore and 27 km across shore. It has a spatially variable resolution that varies between 50 m and 200 m, with the highest resolution at Chincoteague Inlet and Chincoteague Island. The model extends south of Chincoteague and Wallop Islands to Parramore Island, and to the north near Ocean City, MD (Figure 2A). Figure 2B shows a detail of the model bathymetry at Chincoteague Inlet and Figure 2C shows an example of the velocity field (water movement from combined waves, tides, and currents) simulated by the model at Chincoteague Inlet.

Predicting Coastal Change & Guiding Management

In its present form the model can be used to evaluate the coastal impact of select management activities including erosion control/prevention measures, as well as predicted natural changes to the coastal zone surrounding Chincoteague Island in the coming decades.

Model Capabilities & Applications

The CIMS model allows the project team and regional stakeholders to:

- Understand the cause of marsh erosion along the southern end of Chincoteague Island.
- Infer the likely impacts of manipulation of the Wallops Island shoreline through continued shoreline manipulation activities; or the Chincoteague Island shorelines such as through beach nourishment or shoreline hardening.
- Predict possible natural changes to Chincoteague Inlet that could impact:
  - marsh erosion rates.
  - inlet and channel navigation.
  - recurrent flooding on Chincoteague and in nearby mainland communities.
  - the ability of the islands and their marshes to provide protection from storms.

The CIMS model will also allow us to better understand the long-term outlook for the inlet and islands:

- The likelihood of a permanent breach in Tom's Cove Isthmus, separating Tom's Cove Hook from Assateague Island, and causing a wholesale reorientation of Chincoteague Inlet.
- Impacts associated with continued southerly elongation of Assateague Island and Tom's Cove Hook, possibly as far south as Assawoman Island.
- A return to westerly growth of Fishing Point, and repositioning Chincoteague Inlet.

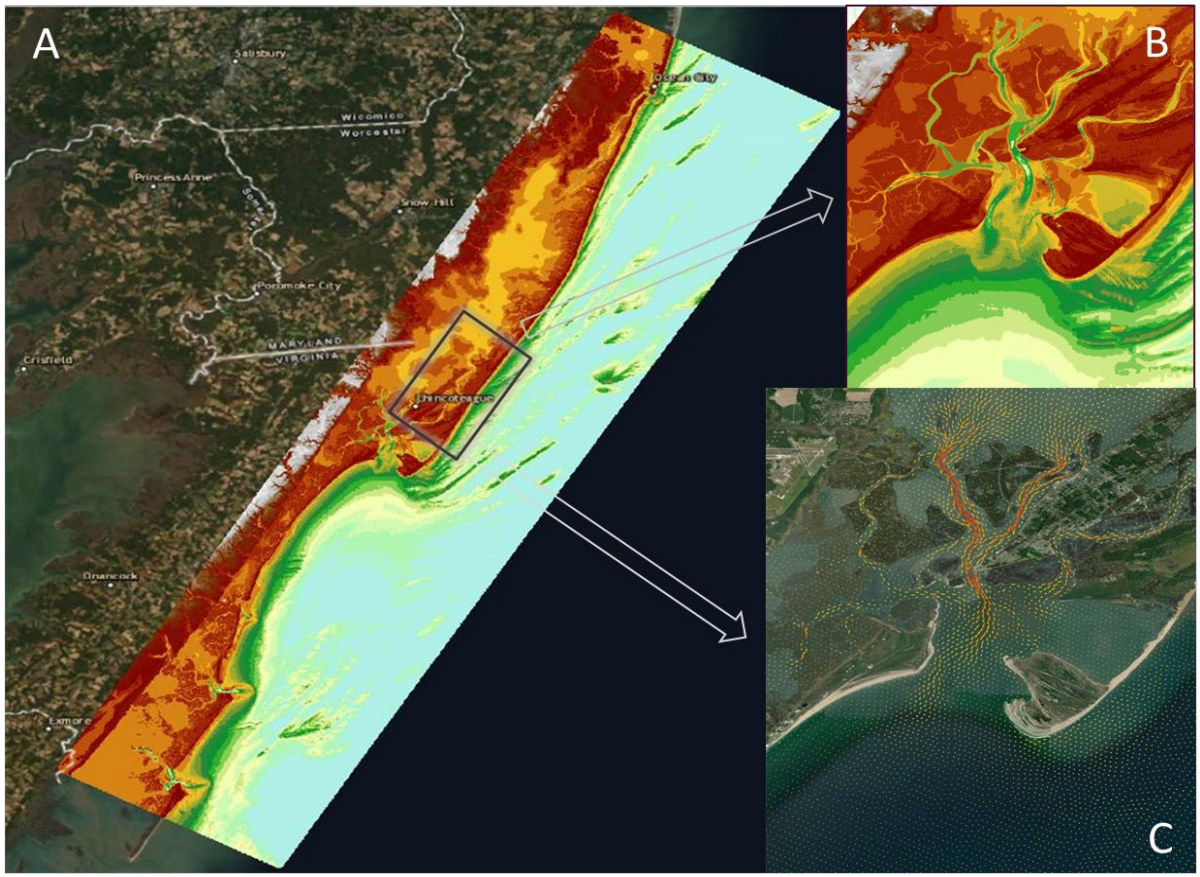

Figure 2. A) Full model domain and bathymetry, B) model domain and bathymetry zoom over Chincoteague Inlet, C) modelled velocity vectors in Chincoteague Inlet. Note in (c) that warmer colors (orange, red) indicate faster water flow, and generally are found in locations of major tidal channels.

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