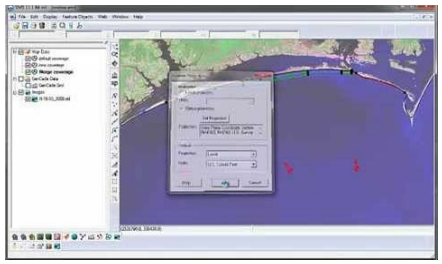
US Army Corps of Engineers®
Engineer Research and Development Center

Coastal Inlets Research Program

Inlet Engineering Tools:

GenCade Model Improvements and V&V

Need



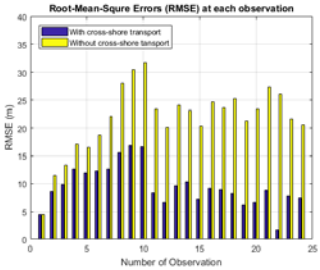
Predicting long-term shoreline change plays an important role in planning and management of coastal zones and regional sediment management. Shoreline change is driven not only by natural processes such as wave- and current-induced sediment transport but by engineering activities such as placement of coastal structures and beach nourishment. The shoreline evolution model GenCade has been developed as a stand-alone application to assess the impact of coastal engineering projects. GenCade calculates shoreline change, wave-induced longshore sand transport, and morphology change along open coasts and at inlets on a local to regional scale. It also accounts for engineering structures such as jetties, seawalls, and groins, as well as engineering activities such as dredging and beach nourishment. In an effort to expand upon existing model capabilities, new features are presently being developed to better constrain the effects of cross-shore sediment transport, model uncertainty, and sea level rise. In addition, continued validation is a long-term strategic goal to improve model performance.

Approach

Verification and Validation (V&V) of GenCade continues to advance through research projects at the Field Research Facility (FRF) in Duck, NC and the Delaware coast. The FRF has a robust long-term dataset to develop new cross-shore transport algorithms and refine the uncertainty analysis feature. The Delaware coast project allows for independent V&V for GenCade and offers new opportunities to improve GenCade's beach nourishment and inlet reservoir module – the latter of which has not been fully tested in GenCade.

Technical Advancements

The following features are under development to expand GenCade's capabilities as a shoreline prediction tool along sandy coastlines.



1) Monte-Carlo simulation to develop probabilistic estimates of shoreline position, which provides a new uncertainty analysis feature important in decision support and planning.
2) New algorithms to include cross-shore transport processes to improve model predictions.
3) Validation of the inlet bypassing and beach fill algorithms.

Leveraging Opportunities

This work is leveraged against ongoing work in the Regional Sediment Management (RSM) Program to develop a GenCade model for the Delaware Coast.

Point of Contact

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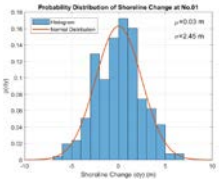

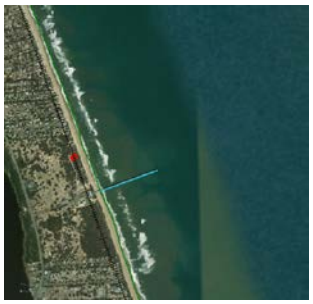

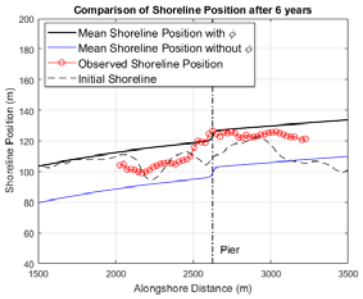

U.S. Army Engineer Research and Development Center
October 2018