

Physics-Based Assessment of Hurricane-Induced Wave Hazards Under Climate Change: Barrier Islands of New Jersey

Dr. Reza Marsooli
Principal Investigator
Department of Civil, Environmental
and Ocean Engineering
Stevens Institute of Technology
rmarsool@stevens.edu

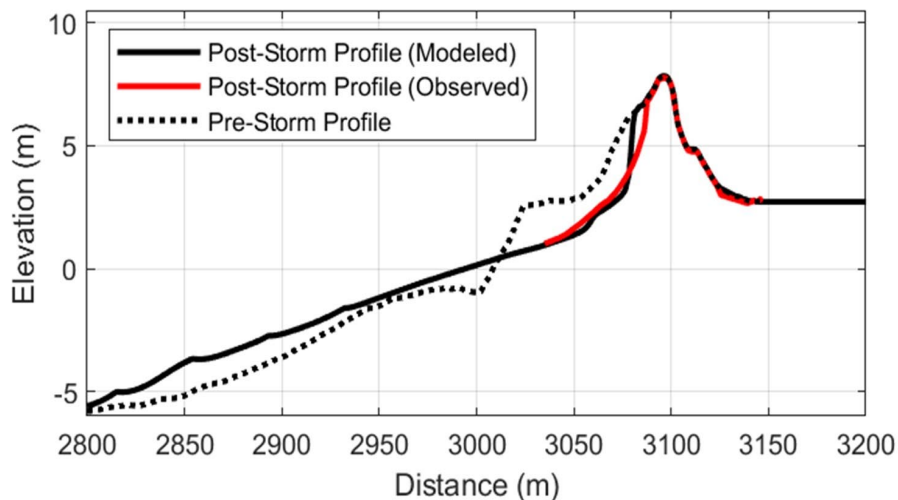
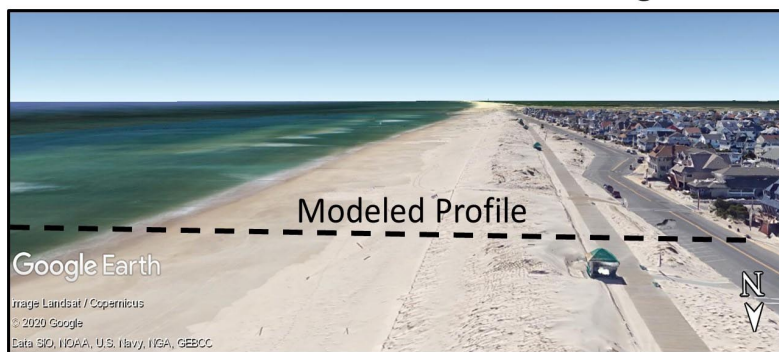
Dr. Jon K. Miller
Co-Investigator
Department of Civil, Environmental
and Ocean Engineering
Stevens Institute of Technology
jmiller@stevens.edu

New Jersey's barrier islands are homes to tens of thousands of New Jerseyans and are the economic engine that powers the state's tourism industry. These islands are primarily protected by beach-dune systems from flooding and storm damage caused by storm surges and waves. Portions of the beach-dune systems previously failed during historical hurricanes, e.g. during Hurricane Sandy in 2012. Extreme surface waves, on top of the storm surge, are the major cause of a beach-dune system failure. Sea level rise and storm climatology change will impact future wave hazards and, in turn, the beach-dune system failure susceptibility.

This project aims to seek answers to the following overarching question: "how vulnerable are the New Jersey's barrier islands to extreme waves in a changing climate?" The project will quantify the impact of 21st-century sea level rise and hurricane climatology change on beach-dune systems within a probabilistic framework. Storm impact and erosion indices and wave runup and overtopping rates will be used as metrics to evaluate the vulnerability of beach-dune systems to present and future wave hazards. The short-term project objective is to identify areas where existing beach-dune systems would fail to protect the barrier islands against future flood hazards. The long-term objective is to aid the development of effective coastal resilience planning in New Jersey. Project objectives will be achieved by dynamic modeling and statistical analysis.

The proposed project will produce scientific information that can assist coastal managers to plan and implement flood

Beach-Dune Erosion Modeling



adaptation strategies for New Jersey's barrier islands, enhancing the resilience to extreme sea levels. New Jersey's barrier islands are the destination of thousands of tourists every summer. Becoming more resilient to flooding will signify not only a safer place to live but also a sustainable and growing economy for the state of New Jersey.