

Tropical Cyclone Storm Wave Hazards in New York/New Jersey Bight

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Storm waves generated by tropical cyclones (TCs) pose serious threats to coastal ecosystem and infrastructure. TC hazards are expected to change over the coming decades, as a result of impacts of global warming on the TC climatology. Due to large uncertainties associated with projections of future climate conditions, hazard assessment studies should be carried out in a probabilistic framework and account for ensemble climate projections. Here we adopt such an approach to study the impact of climate change on TC-induced wave hazards in New York/New Jersey Bight. We estimate the impact of TC climatology change on the wave height return periods from a historical time period in the late 20th century to future periods in 21st century. We use a coupled hydrodynamic and wave model to simulate surface waves for large numbers of synthetic TCs. The synthetic TCs are obtained from a dataset generated by a statistical-deterministic hurricane model for the observed and modeled climate conditions of the historical and future periods. Climate projections from multiple global climate models are considered. Using extreme value theory, we analyze the simulated synthetic waves to estimate wave height return periods. We present and discuss changes in the future wave height return periods in New York/New Jersey Bight.

Keywords: Tropical Cyclone, Extreme Ocean Wave, Hydrodynamic and Wave Modeling