

21st-Century Flood Hazards along the U.S. Atlantic Coast: Impacts of Sea Level Rise and Tropical Cyclone Climatology Change

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Flooding due to tropical cyclones (TC) is among the most destructive coastal hazards along the U.S. Atlantic Coast. TC-induced coastal flooding will worsen under sea level rise (SLR) and climate change. To effectively adapt to these evolving hazards, it is essential to understand potential changes in future flood return levels. The present study investigates the impact of 21st-century sea level and TC climatology on flood return levels along the U.S. East and Gulf Coasts. We use extreme value theory and combine probabilistic estimates of sea level rise and TC storm tides to determine flood return levels for the historical period of 1980-2005 and the future period of 2070-2100 (under the emission scenario RCP8.5). A basin-scale hydrodynamic model is implemented to simulate storm tides for large numbers of synthetic TCs that are generated by a statistical-deterministic TC model under climate conditions observed during the historical period and projected by six climate models for the future period. We present and discuss flood return level projections and the contribution of sea level rise and TC climatology change to the projected changes in the return levels.

Keywords: Storm Surge, Tropical Cyclone, Sea Level Rise, Climate Change, U.S. Atlantic Coast