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Abstract

Hurricane Sandy was one of the most destructive hurricanes in US history, making landfall on the New Jersey coast on October 30, 2012. Storm impacts included several barrier island breaches, massive coastal erosion, and flooding. While changes to the subaerial landscape are relatively easily observed, storm-induced changes to the adjacent shoreface and inner continental shelf are more difficult to evaluate. These regions provide a framework for the coastal zone, are important for navigation, aggregate resources, marine ecosystems, and coastal evolution. Here we provide unprecedented perspective regarding regional inner continental shelf sediment dynamics based on both observations and numerical modeling over time scales associated with these types of large storm events. Oceanographic conditions and seafloor morphologic changes are evaluated using both a coupled atmospheric-ocean-wave-sediment numerical modeling system that covered spatial scales ranging from the entire US east coast (1000s of km) to local domains (10s of km). Additionally, the modeled response for the region offshore of Fire Island, NY was compared to observational analysis from a series of geologic surveys from that location. The geologic investigations conducted in 2011 and 2014 revealed lateral movement of sedimentary structures of distances up to 450 m and in water depths up to 30 m, and vertical changes in sediment thickness greater than 1 m in some