

Long-term behavior of Long Island Ocean Beaches, East Hampton, NY

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A 43-year record of over 600 contemporaneous measurements of beach widths documented differences in behavior at two nearby beaches on the sandy, ocean shoreline of East Hampton, New York. The beaches in East Hampton Village are typically 180 feet wide and composed of quartz sand with a median grain size of 0.2 mm. Average net longshore transport of sand is to the west but the gross transport over the course of a year could be almost four times as great as the net transport. The seasonal cycle is not pronounced. At one location, distribution of measured beach widths over the period of record followed a Gaussian Distribution with fairly equally distributed extreme values of erosion and accretion. At this location a very weak, long-term recession was detected but any linear trend was strongly modulated by multiyear variations in beach widths. A second location, about 2 km from the first, showed a subdued erosional response even though the instantaneous beach widths between the locations showed some (linear) correlation ($r^2 = 0.11$). Beach widths here were better represented better by a Gamma Distribution with fewer occurrences of narrow, eroded beach widths compared to widths wider than average. The different behavior at the second location was attributed to the influence of nearby shore-perpendicular structures (groins) on the longshore sand transport.

Multiyear trends might be attributed to changes in climatic parameters. Although no direct correlations were found related to positive values of the North Atlantic Oscillation (NAO) index, widely taken to be an index of storminess in the northeast, other storm metrics may be indicative of erosional trends. A measure of storminess specifically the atmospheric kinetic energy per unit mass 1.5 km above sea level at 40°; - 70° (provided by K. Chang 2021, School of Marine and Atmospheric Sciences, Stony Brook University), the winter value of this storm metric averaged over December, January and February yielded a reasonable linear correlation ($r^2 = 0.26$) with a winter erosion anomaly at Main Beach. Such preliminary results are promising in a search for climatic predictors of long-term trends in shore erosion and the development of erosion scenarios due to climate change.