EVIDENCE OF A RECENT INCREASE IN STORMINESS ALONG THE NEW JERSEY COAST?

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Abstract: Data from observations of wind, waves and water levels off the New Jersey coast are being analyzed to determine whether there is any evidence of increased storm activity. It has long been postulated that one of the impacts of global warming would be an increase in the frequency and intensity of coastal storms. Existing long-term data sources including wave and water level records are being analyzed to examine this possibility. Researchers have documented regional trends in offshore wave height (Seymour 1996, Allan and Komar 2000, Bromirski et al. 2005) and tidal range (Flick et al. 2003) datasets; however, comprehensive site-specific local analyses are needed. Such an analysis is being undertaken focused on the New Jersey region.

Wave data from a series of five gauges has been analyzed: two offshore buoys (44025 and 44009) maintained by NOAA through the National Data Buoy Center, two nearshore (<100 m from shore) non-directional gauges maintained by Stevens Institute of Technology, and a decommissioned nearshore (<500 m from shore) directional wave gauge, which was maintained by the U.S. Army Corps of Engineers. These gages indicate that over the period of record, wave heights along the New Jersey coast have increased significantly. The initial analysis of the Stevens gauge at Avalon have shown a 0.3 ft/ yr increase in the yearly maximum wave height, and a 0.1 ft/ yr increase in the annual average wave height, while the data set is short, the results are consistent with the longer deep-water NDBC records. Trends, also, suggest that storm duration is increasing, while the recovery period between successive events is decreasing. Wave steepness, which has been linked to erosion, was also examined and a trend indicating an increase in the proportion of steep or erosive events was found.

A non-parametric wave model is being utilized to hindcast wave data for the three nearshore gauges to extend their period of record, in an effort to increase the long-term statistical reliability of the trends of increasing storm activity. The non-parametric model utilizes the offshore buoy data and a regression tree to hindcast the significant wave height and wave period. Prior analysis of the method has indicated that an R^2 value of 0.75 or higher is possible.

Biography: Elizabeth Livermont graduated from Stevens Institute of Technology with a B.E. in Environmental Engineering in May of 2007. After which, she joined the Center for Maritime Systems as a research assistant. She is also currently pursuing her M.E. in Coastal Engineering under the advisement of Dr. Thomas Herrington. Her current research is focused on the use of non-parametric models for use in predicting the nearshore wave environment for the New Jersey coast. She is a member of the American Shore and Beach Preservation Association and the American Geophysical Union.

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