Hurricane erosion of East Coast salt marshes during the past 2500 years: Frequency, scale, recovery and geo-ecological impacts

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We propose to contribute to NICCR's assessment of possible effects of enhanced storm frequency and/or intensity and increased rates of relative sea-level rise during the next 50-100 years on potentially vulnerable sectors of coastal wetland ecosystems. Analysis of carefully collected and well-dated salt marsh stratigraphic, paleoecological and local relative sea-level records from the past 2500 years provides one indispensable frame of reference for anticipating future salt marsh response to such predicted environmental changes. We will perform a stratigraphical investigation of salt marsh deposits to improve our understanding of the factors that determine tidal wetland resistance to storm erosion and their post-erosional recovery potential.

The primary objective is to ***determine the impacts of storm erosion and deposition and of (accelerated) local relative sea-level rise on the evolution, structure and functioning of selected southern New Jersey salt marshes over the past 2500 years***. The salt marshes to be studied provide differing sets of conditions but are characterized by the presence of large areas of open water / mudflat amidst or in the back of extensive marsh land. We contrast data from the open marshes along the north shore of Delaware Bay with those from the barrier protected marshes on the Atlantic between Cape May and Ocean City, New Jersey. In addition, we compare the results from these two study areas with 2500 year-long storm-erosion and storm-recovery records available from relatively small, densely vegetated Connecticut salt marshes.

This study involves careful mapping and dating of transgressive-regressive mud and marsh-peat sequences deposited during the past 2500 years. Very recent work in Connecticut salt marshes has demonstrated that out of a total of eleven erosion surfaces preserved in the deposits of five well-studied marshes, located 3-40 km apart, ten can be attributed to hurricane erosion (repeated synchronous marsh recovery following erosion). Reconnaissance work in the marshes near Sea Breeze, New Jersey has yielded a clear lithostratigraphic framework with multiple abrupt environmental changes, promising a sound basis for analysis and interpretation of relevant records from the proposed study region.