

## **Mapping Rapid Changes in a Barrier Island (Fire Island)**

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Fire Island is very susceptible to erosion and deposition, making it an ideal place to track changes over time for correlation with stratigraphic studies. In this study, we used a series of maps dating back to 1777 and aerial images back to the 1930s to track the evolution of the island. Despite the sparsity and relative inaccuracy of the older maps, they can be a useful tool in understanding how the landscape has changed over time in response to environmental changes and major storms.

This mapping project is related to a research project in the Dept. of Geosciences using GPR (ground-penetrating radar) to examine the subsurface stratigraphic record of the Fire Island's evolution. By combining the information gleaned from the maps and the data from the GPR we are working to identify the stratigraphic features corresponding to the evolution of the shorelines and to correlate major changes in the island's morphology to large erosional events. The most recent of these was Hurricane Sandy, but there have been many others.

The maps we've been studying clearly show a large but intermittent growth of the western end of Fire Island, from near the lighthouses constructed in 1826 and 1858 to its current position 7 km to the west. They indicate that the generally southward and westward dipping geometry of near-surface beds imaged in the GPR data is consistent with overall growth of the shoreline. The maps also show that the growth of the shoreline has not been simple and uniform, either in shape or in rate. This observation helps to explain the otherwise puzzling reversals in dip directions seen intermittently in the GPR data. The mapping is also useful in suggesting future areas for GPR study.