

A GPR-based Stratigraphic Analysis of Robert Moses State Park

Michael Itzkin, Dan M. Davis

Department of Geosciences, Stony Brook University

Long Island's barrier island system is an important but vulnerable geographical feature that serves as a defense against natural disasters for the mainland. This project seeks to better understand the growth and morphology of Fire Island at Robert Moses State Park over time by using ground penetrating radar (GPR) to image the subsurface of the study region. GPR antennas with 250MHz, 500MHz, and 800MHz frequencies were utilized to create primary radar lines running down the axis of the island (east-west). Several transect lines were taken orthogonal to the main lines in order to observe the structure of the region in an additional dimension. Further, a grid-like series of lines was taken over an anomalous structure in order to perform a 3-dimensional analysis of it. The raw GPR lines were processed using a program called ReflexW, which allows the user to enhance the data by removing various types of systematic and frequency-dependent random noise in the data in order to analyze it better. The results gathered so far demonstrate an overall westward growth of the island over time from a previous shoreline located near the Fire Island Lighthouse to the dynamic Democrat Point. The growth features in the GPR lines which one would expect to see are systematically cut by strong erosional surfaces that are present across the island. Further analysis must be done on the source of these erosional events but the working hypothesis is that they are related to storm activity. The water table shows as a reflector that varies gently in height beneath the surface topography. Future work to be done with this data will involve determining if storm breaches from past events can be characterized with a GPR system so that the locations of past events can be dated and studied.