

Carolina Bays: A Late-Pleistocene, Early Holocene Environment

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ABSTRACT

Shallow, elliptical depressions called collectively "Carolina Bays" are found along the North America's Atlantic coastal plain. These features are found from Southern New Jersey to Northern Florida with the greatest concentration in the Carolinas. Some are visible as lakes, while some can be seen only by the white sand rim that defines their perimeters. First revealed in the 1930's in aerial photography, their genesis remains a mystery. Different theorists tout either terrestrial or extraterrestrial processes for their creation. Advocate of terrestrial mechanisms posit the bays existence to climatic processes only while extraterrestrial proponents believe some kind of cosmic impact is responsible. Recent evidence suggesting an extraterrestrial impact may have triggered the Younger Dryas climate change 12,900 years ago has reinvigorated the case for the bay's cosmic origin. (Firestone et al., 2007) However, assigning a date to their creation also suggests methods to resolve the mystery of their creation.

If created by an impact, the bays provide an opportunity to gain insight into cosmically induced climate changes such as that of the K-T event 65 million years ago. If terrestrial processes are proven responsible, as is likely, then a better understanding of late Pleistocene or early Holocene climatic processes may be obtained.

We used a combination of Ground penetrating RADAR (GPR) and soil core sample analysis to determine the characteristics of a small, well defined Carolina bay in the vicinity of Elizabeth City.

At present, Stratigraphic profiles obtained using the GPR seemed to be more consistent with terrestrial processes, however evidence of fire should be subject to further investigation.

Major Research Terms

- A Study of Late Pleistocene Topographical features using:
 - Ground Penetrating Radar &
 - Stratigraphic soil sampling
 - Microscopic soil analysis
 - Pollen identification

Introduction

However, until recently, bay creation due to strictly terrestrial processes has held sway. Their shape is also very suggestive of parabolic dune fields. The fact that they are characteristically found on the unconsolidated, often sandy sediments of the coastal plain argues for their creation due to the strong, sustained winds and dry, cold climate of the Last Glacial Maximum (LGM) when the sparse foliage would have provided inadequate anchor for the loose sediment. Pollen may provide a diagnostic marker with which to establish the age of the bay if the bottom of the depression can be determined and sampled.

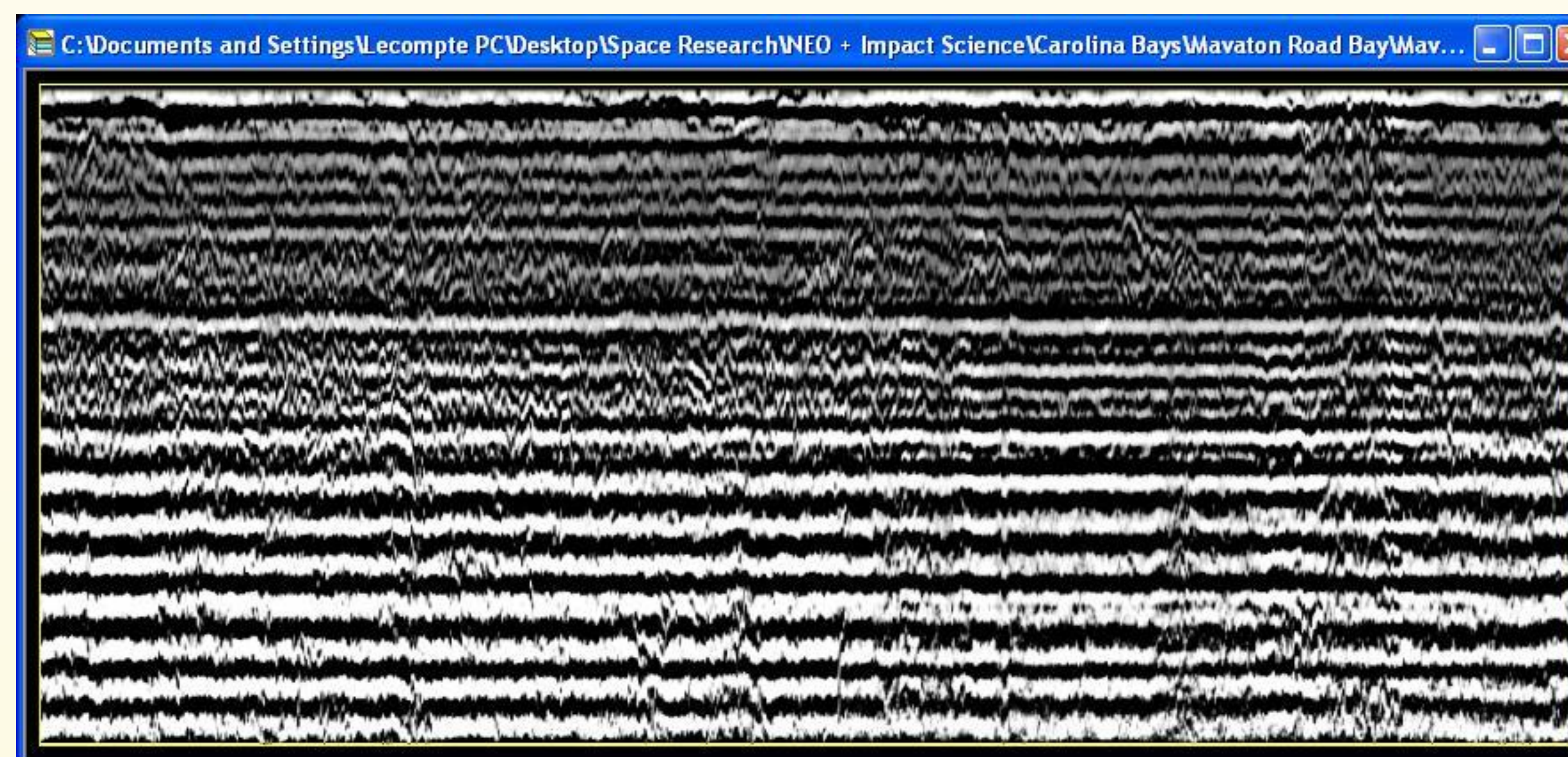


Objectives/Methods

Located in Chowan County, NC, just off Mavaton Road, this bay is at coordinates 35 degrees 11 minutes North latitude and 76 degrees 38.8 minutes West Longitude will be surveyed and sampled using Ground penetrating RADAR (GPR) and a makeshift core sampling device (post-hole digger). GPR will be used to determine the depth of the bay bottom.

Core samples will be taken from the surface to the bottom of the bay.

Evidence of pollen may assist in result determination.



GPR profile of Mavaton Bay: The bay bottom is indistinct suggesting formation by terrestrial processes.

Vocabulary Terms/ Pollen Evidence Found

Triculpate
Monoculpate

Pollen Found

Sphagnum moss
Grass pollen
Fungus Sporangium
Amberspherule

Anticipated Results

The pollen collected using the core samples will be examined and identified by our local pollen expert and the pollen derived from the core sample at the bottom of the depression should enable the age of the bay to be determined. And climate progression to be revealed.



Results

Stratigraphic profiles obtained using the GPR did seem to be more consistent to terrestrial process. Majority of pollen identified in the deepest layer, approximately one meter below the surface was grass with some alder and maple trees indicating a cool and moist climate. The presence of a significant amount of burn scars at the deepest layer suggest grasses replaced the tree population after a significant fire.

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