



Geological Research Activities at the Deering Estate – A Geolaboratory in the Atlantic Coastal Ridge of Florida

Abstract: This presentation synthesizes our current understanding of the geology, hydrology, and sedimentation history across the changing climates and sea levels amid the rich natural resources of the Everglades and Biscayne Bay ecosystems. Our principal findings include:

Geology – Petrographic investigations, field mapping, and geophysical data reveal surficial deposits that date to the last sea-level highstand (~125 ky BP) and that largely represent shallow marine carbonate sediments deposited in tidal shoals and channels. An overlapping shoreline deposit was accreted via longshore drift at the end of the last highstand, creating a barrier ridge that 'sealed' off tidal channels from Biscayne Bay.

Hydrology – Surficial deposits at the Deering Estate are all shallow marine in origin; freshwater had no part in modifying these sediments until sea level fell at ~118 ky BP. Dissolution modified the porosity and enhanced the permeability once these sediments were exposed to freshwater. Cycles of Pleistocene sea level rise and fall were key to creating the highly-productive Biscayne aquifer system. Solution pits and sinkholes developed on the land surface from 118 ky BP until sea level returned to modern levels < 6 ky BP, at which time the solution pits, sinkholes, and tidal channels flooded with freshwater moving toward Biscayne Bay. Freshwater dissolved caves along the margins of the re-occupied channels, glades, connecting water through the accretionary ridge to springs in Biscayne Bay. These caves are horizontal, vertically restricted, and laterally extensive, with shaft entrances formed through the action of tree root growth and decay.

Sedimentation – Following marine deposition and sea-level fall at ~118 ky BP, sediments at the Deering Estate were produced by chemical weathering and soil production. Some of these weathered sediments filled solution pits, and occasionally entombed Pleistocene mammal bones. Exposed limestone surfaces developed a red paleosol (caliche). Renewed marine sedimentation commenced < 6 ky BP with a mixture of carbonates and silica sand. Around the time of Spanish contact (1450-1540 AD) the

sedimentation regimen changed and included charcoal-rich silica sand that filled caves and sinkholes near the glade margins and created a sand blanket in Biscayne Bay upon which modern mangroves at the Deering Estate established.

Given the above, the wealth of Archaic through Tequesta cultural remains at the Deering Estate match the value of the site as a water-way connection between the resources in Everglades and Biscayne Bay. Prevalent Spanish artifacts on-site suggest they knew that as well. However, charcoal-rich sediments dated to Spanish contact hint at changing land use and increased runoff. Large-scale mangrove growth post Spanish contact devalued the Deering Estate as site for habitation.



Featuring

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Research
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3:00 p.m. Friday, September 4th, 2020

Remote Session via Zoom:

<https://fiu.zoom.us/j/95135104846>

This event is free and open to the public

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