Long Island Carolina Bays: Wind, Water, or Impact?

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Based on their abundance and apparent radial arrangement, in 1933 Melton and Schriever suggested that Carolina bays may have been produced through meteoric impact (Melton, 1933). In 2007 the impact model was reintroduced as part of the Younger Dryas Impact Hypothesis by Firestone et al. based on the observation of potential impact-related sediments, such as SLO's, microspherules, and glassy carbon spherules, found within a discreet layer located near the base of numerous Carolina bays (Firestone, 2007). Although the patterns of size, shape, and arrangement of Carolina bays (on Long Island and in other regions of the US) are intriguing, and suggestive of a common origin, the patterns are inconsistent with the size, shape, and arrangement expected from secondary impacts as hypothesized by Firestone (2007). Most recently stratigraphic studies of the Rocky Point Carolina bays have shown that these structures are limited to the upper 1 meter of sediment and are purely superficial structures.

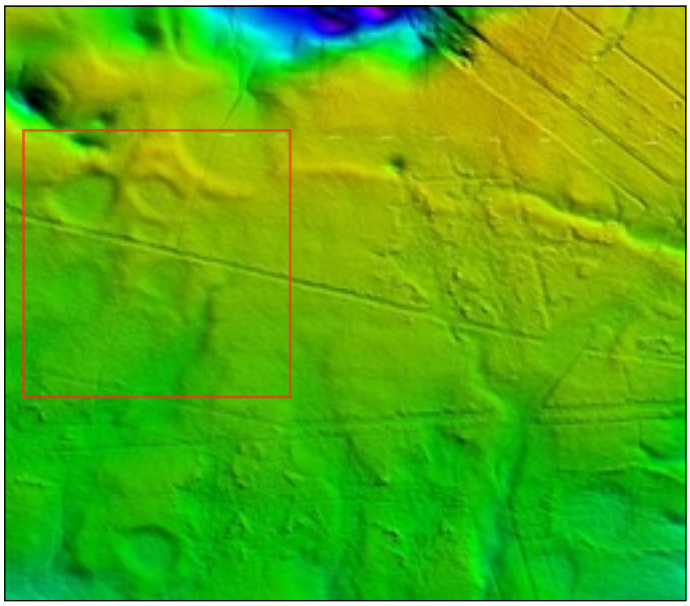

Figure 1. Red square outlining region of study which includes numerous Carolina bays

Previous studies of the Carolina bays within the Rocky Point Resource Management Area have produced similar sediments as those described by Firestone (2007), Wittke (2013), and Israde (2012). However due to the numerous modes of formation of these sediments their use as a proxy for meteoric impact remains highly debatable. Furthemore, subsurface exploration has revealed an undisturbed continuous clay-sand contact running through each of the Carolina Bays. Since any impactor capable of producing a crater the size of the Carolina bays within the study site would also excavate sediments much deeper than 1 meter, the presence of this boundary throughout the site shows that these structures could not have formed through meteoric impact.

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References Cited

Firestone, R. B., West, A., Kennett, J. P., Becker, L., Bunch, T. E., Revay, Z. S., . . . Erlandson, J. M. (2007). Evidence for an extraterrestrial impact 12,900 years ago that contributed to the megafaunal extinctions and the younger dryas cooling. *Proceedings of the National Academy of Sciences*, *104*(41), 16016-16021.

Israde-Alcántara, I., Bischoff, J. L., Domínguez-Vázquez, G., Li, H. -C., DeCarli, P. S., Bunch, T. E., . . . Wolbach, W. S. (2012). Evidence from central mexico supporting the younger dryas extraterrestrial impact hypothesis. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(13), E738-E747. doi: 10.1073/pnas.111061410

Wittke, J. H., Weaver, J. C., Bunch, T. E., Kennett, J. P., Kennett, D. J., Moore, A. M., . . . Firestone, R. B. (2013). Evidence for deposition of 10 million tonnes of impact spherules across four continents 12,800 y ago. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(23), E2088-97. doi:10.1073/pnas. 1301760110