CENOZOIC IMPACT STRATIGRAPHY OF THE SOUTHEASTERN ATLANTIC COASTAL PLAIN. R. S. Harris[1] and S. J. Jaret[2], [1]Department of Space Sciences, Fernbank Science Center, 156 Heaton Park Drive, Atlanta, GA 30307, [2]Department of Geosciences, Stony Brook University, Stony Brook, NY 11794-2100; scott.harris@fernbank.edu.

Introduction: The identification of ejecta from asteroid and comet impacts can prove especially difficult in sedimentary sequences dominated by long periods of active estuarine systems. The Carolina and Georgia coastal plains are such an environment. Yet they are well-situated to have received debris from any number of marginal marine to deep ocean impacts in the Atlantic basin over the last ~70 million years, including of course, the large Chicxulub and Chesapeake Bay events.

The ejecta horizons for even those large, close impacts proved challenging due to the typical *inability* of estuarine systems to deposit regionally continuous layers coupled with their *ability* to incise deep, wide, and migratory valleys capable of obliterating any regionally extensive strata that might have formed. Nevertheless, we were eventually able to constrain where those ejecta fit into the successions [1, 2] at least on the scale of hundreds of square kilometers. Efforts to correlate impact horizons over thousands of square kilometers across the region are significantly more difficult but are worthwhile to pursue for three reasons. First, when impacts horizons can be correlated across such systems, they provide precise time markers that otherwise can be elusive. Second, regional correlations may be necessary to understand subtle changes to the ecology. And finally, accurate regional correlations are important to sort out exactly how many impacts are recorded. In cut-an-fill systems, it is an ever-present concern that ejecta from a single event might be spread vertically over a large temporal space just as multiple events can be merged into one single gravel bed.

Of special interest in east-central Georgia to west-central South Carolina are those strata deposited during the middle to latest Eocene and early Oligocene. Not only are the sequences thick, they often are exposed by commercial mining as the high walls in clay mines and overburden in aggregate quarries. They span a time of time of important global climate change [3] from "hothouse to icehouse" as well as period of probable increased flux of asteroids to the inner solar system [4].

We review the evidence, and new results, for several impacts, including Chicxulub and Chesapeake Bay, which may have contributed to the sediment supply and architecture of this coastline throughout the Paleogene.

Upper Oligocene. Taylor et al [5] reported extraterrestrial magnetic spherules in the upper Oligocene Ashley Formation from Sullivan's Island, South Carolina. It is unclear whether or not these spherules represent an impact event, an airburst, or some other delivery of cosmogenic material to the ocean basin.

Lower Oligocene. We have investigated an anomalous horseshoe-shaped outcrop of Eocene-Oligocene boundary (?) sandy limestones and chert rimming a circular valley in eastern Houston County, Georgia. The feature has a diameter of approximately four kilometer. Preliminary work identified quartz grains with possible planar deformation features (PDFs) in the rim deposits (Fig 1.), but these could be reworked from lower upper Eocene units.

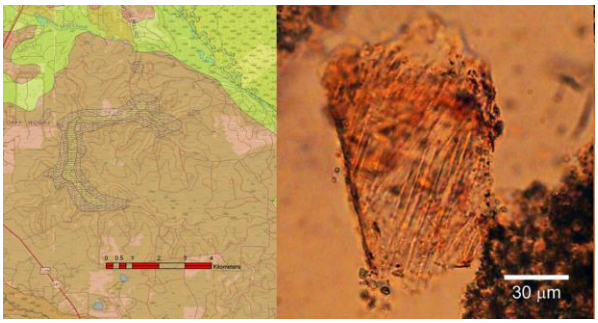

Figure 1. Geologic map and topography demonstrating a unique semicircular feature approximately 4 km wide in Houston County, Georgia. Rim deposits are early Oligocene sandy limestones and chert. Some quartz sand grains contain possible PDFs.

Upper Eocene. The in situ deposits believed to be ejecta from the Chesapeake Bay impact (35.5 Ma) that occur in the walls of several kaolin mines in east-central Georgia have been described by [1]. Efforts to correlate the horizon with Carolina units have been limited, but some sands collected from alluvium in Lenoir County, North Carolina exhibit possible PDFs. These sands most likely are sourced from the New Bern Formation. That stratum merits more investigation.

Upper Eocene (continued). The Albion Member of the Clinchfield Formation (~37 Ma), extending from central Georgia to Aiken, South Carolina, is an unusual unit. It is rather uniform in thickness (1-2 meters) and elevation. It has the appearance of a weathered volcanic pyroclastic debris flow (Fig. 2). But it contains a large volume of sponge spicules along with a monotonous assemblage of quartz silt, small kaolin fragments, and biogenic silica. We previously [6] have suggested that this could represent emplacement after an offshore/deep shelf impact. We will present additional evidence and arguments to support this hypothesis.

Cretaceous-Paleogene Boundary. The upper Maastrichtian/lower Danian clay and spherule layers near Columbia, South Carolina have been described [2]. But efforts have been made to correlate that horizon back to the southeast into Georgia. Possible isolated shocked quartz grains have been found in lower Paleocene lags associated with "boulder-like" deposits. It is worth considering if these are the product of impact-generated tsunamis.

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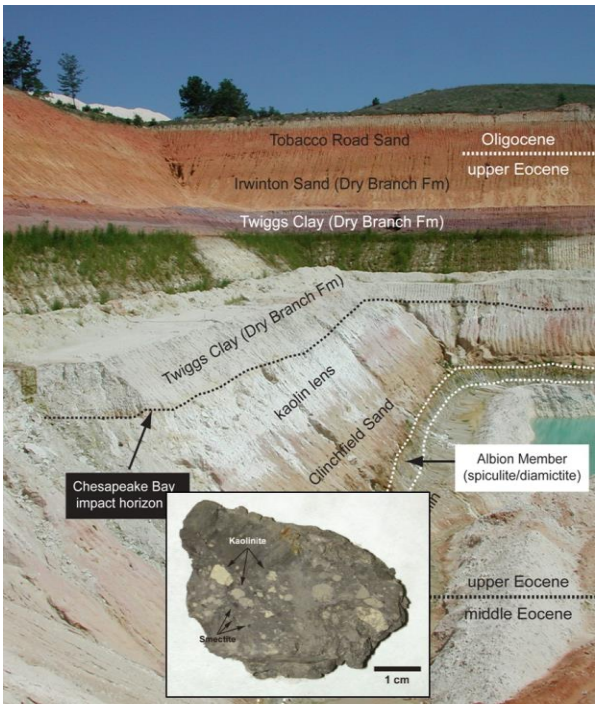

Figure 2. Photograph illustrating the upper Eocene to Oligocene succession common in east-central Georgia and western South Carolina. The horizon containing ejecta most likely from Chesapeake Bay is outlined. The older Albion Member of the Clinchfield Formation is unusual in the region, having a texture (inset) similar to weathered volcanics but containing abundant sponge spicules.