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Title: Paleo-Inlet Dynamics and The Genesis Of Shelf Sand Ridges Using Benthic Foraminifera:
Old Currituck Inlet, VA/NC

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ABSTRACT

Shelf sand ridges are common features along the US Atlantic continental shelf, often grouping to form ridge and swale topography. The distribution of shelf sand ridges has been widely studied, yet the origin and evolution of these features remain poorly understood. The goal of this research is to determine the genesis of shore-oblique sand ridges through testing each of several hypotheses of sand ridge formation against the internal stratigraphy and benthic foraminiferal distributions of a shoreface-attached sand ridge. Of the existing hypotheses, one proposes a genetic relationship between tidal inlet processes and the formation of shelf sand ridges. False Cape Shoal A, a shoreface-attached sand ridge immediately offshore the Virginia/North Carolina border was chosen for this study due to its proximity to a historically documented former tidal inlet system, Old Currituck Inlet. This study utilizes 391 micropaleontological samples from 20 vibracores to first determine if the former tidal inlet is recorded in the stratigraphy and foraminiferal assemblages of the estuarine sediments, and secondly, to analyze the stratigraphy and foraminiferal assemblages of False Cape Shoal A. Previous research

addressing the origin and evolution of False Cape Shoal A proposed that this sand ridge 1) was an ancient coastal dune-beach complex formed at variable Pleistocene sea level stands, 2) formed during intense storms through shelf processes, or 3) formed from reworking of an abandoned ebb tidal delta as part of a former tidal inlet system. The stratigraphy of False Cape Shoal A invalidates the conclusion that these sand ridges were formed during the Pleistocene because they overlie both Holocene estuarine muds and the shoreface ravinement surface. Though False Cape Shoal A may indeed be maintained through shelf processes, the stratigraphy and foraminiferal signature of this sand ridge indicate a core unit dissimilar to modern shoreface and shelf deposits, refuting the hypothesis of ridge generation by storm flow. The stratigraphy and foraminiferal assemblages documented in this study reveal an ebb tidal delta nucleus in False Cape Shoal A and support the hypothesis of sand ridge origination from an ebb tidal delta. A model of sand ridge genesis based on foraminiferal distributions is presented.