Evidence of Environmental Change from Foraminiferal and Sedimentological Correlation in an Incised Valley: Baffin Bay, Texas

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During the last Quaternary sea-level fall (120-20 ka), Baffin Bay formed by the down-cutting of Los Olmos, San Fernando, and Petronila Creeks in south Texas. This incised valley was then backfilled since the Last Glacial Maximum with mixed siliciclastic/carbonate sediments that record coastal environmental changes over the past 10 ky. Previous sedimentological and seismic analysis shows that Baffin Bay contains atypical depositional environments as a result of its semi-arid climate setting and isolation from the Gulf of Mexico. These environments include well-laminated interbedded carbonate and siliciclastic muds, prograding upper-bay mudflats, and sandy-shell internal spits. Four different stratigraphic surfaces can be recognized within the deposits, and are chronostratigraphically constrained using radiocarbon dates. The purpose of the present study is to use foraminifera to create a separate account of change and to determine if foraminiferal data corroborate sedimentological evidence for sea-level and climate fluctuations. Foraminifera were sampled at intervals from a 14.4 m dated core and from surface and subsurface sediments of five cores along a transect. Multiple discriminate analysis was used to compare intervals of the core according to species proportions, and clearly delineates three different foraminiferal communities. Breaks between these communities coincide with two of the flooding surfaces observed in the core, one at about 8.0 ka and the other around 5.5 ka. Rapid sea-level rise at the 8.0 ka flooding surface corresponds with a shift from a deltaic to an open-bay foraminiferal assemblage, while faunal change across the 5.5 ka surface appears to be due to the formation of Padre Island and onset of more arid climate conditions. Although agglutinated foraminifera were not found in the 14.4 m core or in earlier studies from Baffin Bay, they were found in one transect core in a sandy shell-hash spit. In general, foraminiferal analysis supports sedimentological interpretations in that assemblages are consistent with different sedimentary facies and parasequences observed in the cores.