Imaging the Internal Movements of Galveston Island and Bolivar Peninsula with Ground Penetrating Radar

Aubrey Hepler[1], Shuhab Khan[1], and John B. Anderson[2]

[1]Department of Geophysics, University of Houston, 4800 Calhoun Rd., Houston, Texas 77004

[2]Department of Earth Science, Rice University, 6100 Main St., Houston, Texas 77005

GCAGS Explore & Discover Article #00018*
http://www.gcags.org/exploreanddiscover/2016/00018_hepler_et_al.pdf
Posted September 13, 2016.

*Abstract extracted from a full paper published in the *GCAGS Transactions* (see footnote reference below), which is available as part of the entire 2016 *GCAGS Transactions* volume via the GCAGS Bookstore at the Bureau of Economic Geology (www.beg.utexas.edu) or as an individual document via AAPG Datapages, Inc. (www.datapages.com), and delivered as an oral presentation at the 66th Annual GCAGS Convention and 63rd Annual GCSSEPM Meeting in Corpus Christi, Texas, September 18–20, 2016.

ABSTRACT

This paper focuses on barrier island migration and growth direction is studied through the use of ground penetrating radar. In general, all barrier islands are located along coastlines separated from the mainland by a sound body of water, such as, a bay or lagoon. However, not all barrier islands are created equally. There are several theories that suggest barrier island growth and migration are a result of emerged submarine sandbars, spit growth followed by breached inlets or submerged beach-ridges. These hypotheses have been tested for nearly a century; the conclusion is no one theory is exclusive to barrier island development. The theory of emerged submarine sandbars having formed a barrier island assumes the waves come to shore, nearly perpendicular, while picking up loose sediments along the way that are deposited on the bars. The bars eventually emerge above the sea's surface creating the subaerial landform. The next theory, spit growth followed by breached inlets, suggests that a spit formed from land and lengthened out along the mainland from longshore currents over a period of time eventually breached by storm-induced tides forming tidal inlets. The last barrier formation theory involves a submerged dune ridge along the coast, which emerges when sea -level rises. After interpretation of the data for Bolivar and Galveston Island the two possible theories of interest are the emergence of submarine bars or submerged dune-ridges. The theory of spit formation is not supported because Bolivar Peninsula (~1.7 ka) is much younger than Galveston Island (~5.3 ka), so Bolivar formed after Galveston was already established.

Originally published as: Hepler, A., S. Khan, and J. B. Anderson, 2016, Imaging the internal movements of Galveston Island and Bolivar Peninsula with ground penetrating radar: Gulf Coast Association of Geological Societies Transactions, v. 66, p. 251–259.