Depositional Processes and Stratigraphy of Heald Bank on the East Texas Inner Continental Shelf

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GCAGS Explore & Discover Article #00091*

http://www.gcags.org/exploreanddiscover/2016/00091_swartz_et_al.pdf Posted September 13, 2016.

^{*}Article based on an extended abstract 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.

EXTENDED ABSTRACT

Heald Bank is a sand bank located ~50 km off the East Texas coast (Fig. 1). It, and a series of neighboring banks, has been proposed to be a remnant barrier island drowned by Holocene sea level rise (Rodriguez et al., 1999). Interest in the bank is driven both as a potential marker of previous shoreline position as well as a potential source for offshore sand dredging (Morton and Gibeaut, 1995; Rodriguez et al., 1999). Previous work identified a facies succession characteristic of a tidal/shoreface environment, and noted the close association of the bank with the nearby Sabine/Trinity incised valley system (Fig. 1) (Rodriguez et al., 1999). The valley system has no modern morphologic expression, and is filled with backstepping tidal bayhead delta deposits that track the approximate shoreline position through the latest transgression (Thomas and Anderson, 1994). The bank occurs in 5–20 m water depths and the shallowest portion appears to exhibit active bedforms indicating modern reworking by waves and currents (Rodriguez et al., 1999).

We present ~90 km of high-resolution full-waveform CHIRP seismic data collected by the University of Texas Institute for Geophysics (UTIG) marine geophysical field course over Heald Bank and the surrounding continental shelf, in addition to new analyses of CHIRP data collected by the Texas General Land Office and U.S. Geological Survey in 2009 (Fig. 2). This imaging identifies a large and complex channel network below and surrounding the bank that was previously unobserved. These channels in some cases have equivalent relief to the nearby Trinity/Sabine incised valley structures. We find no distinct shoreface sequences making up the bank. Rather, Heald Bank sits entirely above a transgressive ravinement surface. This erosional surface truncates layered sediments that infilled the deeper channel structures (Fig. 3). The seafloor surrounding the bank appears either non-depositional or erosional in nature, and older channel fill materials appear to be undergoing modern erosion and scouring. Our anal-

Originally published as: Swartz, J. M., J. A. Goff, and S. P. S. Gulick, 2016, Depositional processes and stratigraphy of Heald Bank on the East Texas inner continental shelf: Gulf Coast Association of Geological Societies Transactions, v. 66, p. 891–894.

ysis suggests that Heald Bank is not a drowned barrier island, and the paleo-shelf environment is more complex and dynamic than previously thought.