Comparison of Structural Styles Observed in Upper Eocene (Jackson Group) and Oligocene (Vicksburg Group) Strata within the Rio Grande and Houston Embayments Southwest and Northeast of the San Marcos Arch, Refugio and Calhoun Counties, South Texas Gulf Coast

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ABSTRACT

This paper presents structural styles associated with the upper Eocene (Jackson Group) and lower Oligocene (Vicksburg Group) located in the Rio Grande and Houston embayments southwest and northeast of the San Marcos Arch of the South Texas Gulf Coast, respectively. Previous studies that focused on the Rio Grande Embayment documented structural styles that include unusual coast-perpendicular faults, diapiric shale, and subbasins.

Present work involves mapping the structural styles in the Houston Embayment and comparing the deformational pattern in both basins using 3D seismic data from four different surveys. Two of the seismic surveys (surveys #1 and #2) are located in Refugio County in the Rio Grande Embayment. The other two are located in the Houston Embayment—one (survey #3) within Calhoun County and the other (survey #4) straddling Calhoun and Jackson counties and Matagorda Bay. Methods of investigation consist of seismic interpretation, 3D visualization, and seismic-attribute extraction.

Our map at the top of the Vicksburg in the vicinity of the San Marcos Arch shows that: (1) although the prevailing mechanism of deformation during the deposition of the Eocene (Jackson Group) and Oligocene (Vicksburg Group) in the Rio Grande and Houston embayments was extensional tectonics, stratal deformational patterns are different in each basin; (2) in the Rio Grande Embayment, the dominant structural styles are mostly coast-orthogonal faults and shale ridges, prominent northeast-southwest-southeast trending curvilinear anticlines, and coast-parallel synthetic and

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antithetic faults; whereas in the Houston Embayment, the dominant structural styles consist of coast-parallel synthetic growth faults and shale diapirs; (3) the Houston Embayment is about 3050 m (10,015 ft) deeper than the Rio Grande Embayment; (4) the remnant erosional anticlinal structure within the Houston Embayment constitutes a potential hydrocarbon prospect; and (5) the diapiric structure along COCORP line TX4 in the Houston Embayment is interpreted to be composed mostly of overpressured shale.

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