

Basement Control of Coastal Surface Morphology in Southwest Louisiana

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ABSTRACT

Previous studies of the Gulf of Mexico tectonic elements and structural features reveal patterns of symmetry in the continental crust related to the rift development of the Gulf Basin. From these studies the framework of the basement structures and depositional systems led to observations related to the shallower Quaternary Period deposits of the Red River and Mississippi River systems in southwest Louisiana. In addition, previous studies provided knowledge of these tectonic elements and structural features from approximately -5,000 ft mean sea level (MSL) to the basement surface (approximately -55,000 ft MSL). Part of a geologic characterization study of the Quaternary System Chicot Aquifer in southwest Louisiana is a structure map for the Pliocene-Pleistocene chronostratigraphic boundary. This structure map includes a maximum depth of approximately -3,000 ft MSL in the southeastern parishes of Vermilion and St. Mary in the Chicot Aquifer area. The contouring on the map shows a strong correlation to the regional faulting and the location of salt domes in the 15-parish study area. By projecting the offshore position of transfer faulting in the Acadian Segment of the northern Gulf Basin, it can be observed that the depositional and salt dome features match the position of the northwest-southeast trend of the basement structural elements. This correlation provides an explanation for the origin of the Five Island salt domes, and possibly other surface morphological features of Louisiana's Gulf Coast.