

Relative Sea-Level Rise History in Louisiana

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Abstract

The analysis of tide gauge records provides an opportunity to quantify changes in sea-level elevation relative to another datum, such as land, to which the gauge is fixed or referenced. Relative sea-level change describes the time-averaged difference in elevation that develops between these datums as eustatic sea-level changes or land subsidence occurs. On the Mississippi River delta plain subsidence takes place in response to regional (e.g. crustal flexure) as well as local mechanisms (e.g. compaction of Holocene sediments). Absolute elevation changes affecting these two datums cannot be individually distinguished within a tide gauge record. In the Gulf of Mexico, there are more than 100 tide gauges maintained by the National Oceanic and Atmospheric Administration and the U.S. Army Corps of Engineers, collectively providing a 100-year record of regional relative sea-level change in the 20th century. Using these tide gauges, we present an updated record of relative sea-level change for the Gulf of Mexico that includes previously unused tide gauges and a longer record of change. Comparison of our recent analysis to previous results indicates that rates of maximum relative sea-level rise in Louisiana have remained relatively constant at 1cm/yr for the period 1939 to 1999. The comparison also indicates that the Mississippi River delta plain in Louisiana is experiencing some of the highest rates of relative sea-level rise in the Gulf of Mexico. The overall highest rates of relative sea-level rise are located within the south-central part of the delta plain and proximal to the modern birdfoot depocenter. Toward the western chenier plain and Texas the rates become less, as well as toward the east across Mississippi, Alabama, and Florida.