Vertical Accretion and Sea Level Rise: Implications for Estuarine Wetlands on Mustang Island, Texas

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ABSTRACT

In this study, a Cs-137 technique was applied to determine sedimentation rates in different types of estuarine wetlands along the bay shoreline of a Texas barrier island. A total of 17 pound cores were analyzed in high marsh, high flat, low marsh and low flat environments along two transects. Cores were sub-sampled at 1 cm intervals and analyzed for bulk density, grain size, and organic content. A shallow compaction model was used to convert sedimentation rates to rates of vertical accretion. By the end of this century, sea level will be higher than the current upward extent of estuarine wetlands on Mustang Island, Texas. The fashion in which these environments will change depends to a large part on how chronic submergence is offset by vertical accretion. Predicting future changes in wetland distribution bears important implications for coastal resource management and community planning. Our results indicate that the rate of vertical accretion is inversely related to elevation for high marsh and high flat environments; this relationship breaks down due to analytical uncertainty in Cs profiles from highly bioturbated lower environments. High marsh environments accrete and vertical accretion rates vary between 1.13 and 4.6 mm/yr, lower than the rate of sea level rise in the area. The Cs-137 peak could not be located in low marsh environments due to intense bioturbation. In addition, accretion is dominated by mineral sediment.

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