

Contribution of recent hurricanes to wetland sedimentation in coastal Louisiana

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Hurricanes are important agents of sediment deposition in the wetlands of coastal Louisiana. Since Hurricanes Katrina and Rita of 2005, coastal Louisiana has been impacted by Hurricanes Gustav (2008), Ike (2008), and Isaac (2012). By employing the principles and methods of paleotempestology we have identified the storm deposits attributed to the three most recent hurricanes in several coastal lakes and swamps in Louisiana. However, the spatial distribution and volume of these storm depositions cannot be easily inferred from stratigraphic data derived from a few locations. Here we report on results from a GIS study to analyze the spatial and temporal patterns of storm deposition based on data extracted from the voluminous CRMS (Coastal Reference Monitoring System) database, which contains vertical accretion rate measurements obtained from 390 wetland sites over various time intervals during the past decade. Wetland accretion rates averaged about 2.89 cm/yr from stations sampled before Hurricane Isaac, 4.04 cm/yr during the 7-month period encompassing Isaac, and 2.38 cm/yr from sites established and sampled after Isaac. Generally, the wetland accretion rates attributable to the Isaac effects were 40% and 70% greater than before and after the event, respectively. Accretion rates associated with Isaac were highest at wetland sites along the Mississippi River and its tributaries instead of along the path of the hurricane, suggesting that freshwater flooding from fluvial channels, enhanced by the storm surge from the sea, is the main mechanism responsible for increased accretion in the wetlands. Our GIS work has recently been expanded to include other recent hurricanes. Preliminary results indicate that, for non-storm periods, the average wetland accretion rates between Katrina/Rita and Gustav/Ike was 2.58 cm/yr; that between Gustav/Ike and Isaac was 1.95 cm/yr; and that after Isaac was 2.37 cm/yr. In contrast, the accretion rates attributable to the effects of Gustav/Ike and Isaac were 4.41 cm/yr and 3.52 cm/yr, respectively. These results show that hurricane-related accretion rates in wetlands are 50 – 225% higher than the normal rates typical of non-storm periods.