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Impacts of tropical systems on the sedimentary fabric of the Mississippi Sound

A geologic investigation was conducted in the Mississippi Sound to determine patterns of estuarine sedimentation during the late Holocene. Major sources of sediment include the Pearl River, Mobile River, and transgressive barrier island sands. This sediment is delivered and reworked by episodic tropical systems and winter storms. Below fair-weather wave base, major storm events are recorded as sandy event layers in a muddy matrix.

Gravity and box cores were analyzed using radioisotope geochronology (^{210}Pb, ^{7}Be, and ^{137}Cs), x-radiography, granulometry, and a multi-sensor core logger. Gravity core analysis reveals 5-8 event layers in ~3 m gravity cores. Our ^{210}Pb/^{137}Cs observations indicate accumulation rates of 0.3-0.5 cm y^{-1}. Wave data collected from Tropical Storm Isidore and Hurricane Lili indicate intense reworking of sediment on the shelf and moderate reworking of the sediment in the Sound. Higher near-bottom orbital velocities were calculated for Tropical Storm Isidore than Hurricane Lili. Box cores collected after the storms contained a variable muddy event layer up to ~10 cm thick on the shelf and < 5 cm thick within the Sound. In contrast, event layers produced by major hurricanes (such as Camille, 1969), reach thicknesses exceeding 10 cm. Because of post depositional mixing, only event layers thicker than 5 cm in the Sound and ~10 cm on the shelf have significant preservation potential. Thus, data indicate that only major hurricanes create preservable event layers in the Mississippi Sound and represent 8-26% of the sediment column deposited in the last 600-1000 years.