

High-Resolution Imagery of Mudflows in the Mississippi River Delta: Results from Multibeam, Sidescan Sonar and Subbottom Profiler Data

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The offshore Mississippi delta is characterized by frequent submarine mudflows, which have caused extensive damage to infrastructure in the area. The slopes in this region are very gentle (typically < 1.5°) and the mudflows are thought to be triggered by storm-inducing deep waves. The 2005 hurricane season caused unprecedented levels of damage in the Gulf of Mexico. Post-hurricane surveys carried out by the industry determined that much of the damage was caused by mudflows that originated on the upper portions of the Mississippi birdsfoot delta.

The goal of a June 2007 survey aboard the R/V Pelican was to image the source of the mudflows in the shallow water (18 m to 50 m) portion of the mudflow area. Data was acquired using a pole-mounted EM3002 (300 kHz) multibeam system, and a towed dual frequency Benthos Datasonics SIS-1000 with a side scan sonar (90-110 kHz frequency) and sub-bottom profiler (2-7 kHz frequency) fish, which were run over an 8 km by 2 km grid at a 100 m line spacing pattern.

Multibeam and sidescan sonar data imaged the shallow portions of eight separate mudflows, including the source of one of the flows. The seafloor imagery shows spectacular detail of the head of the mud flows, and its connection with a dredge dump location. The five westernmost flows originate at a known dredge dump site and appear significantly wider than the three flows to the east. The eastern flows are more clearly delineated in the seafloor imagery and follow more tortuous downslope paths. This suggests a possible anthropogenic component to mudflow sourcing in this area.

The subbottom profiler data show large blocks of material containing intact stratigraphy located within the mudflow gullies. High dips were observed in numerous blocks in both the strike and dip directions. The base of these blocks was imaged in places, suggesting that the blocks move downslope by sliding on top of more rigid material. No high relief mudflows were observed in these data.