



Sonar Mapping of Hurricane Harvey Effects on Bolivar Roads Seafloor

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ABSTRACT

Bolivar Roads is the main inlet to Galveston Bay and the nexus for water exchange between the estuary and Gulf of Mexico. It is the entrance to the Houston Ship Channel (HSC) and location of the gate for the proposed coastal spine (Ike Dike). Hurricane Harvey dumped trillions of gallons of rain water in the Galveston Bay watershed, causing swift seaward currents through Bolivar Roads. We conducted surveys with side-scan and chirp sonars in Bolivar Roads prior to the storm to map seafloor sediment types. After the storm, a repeat survey was conducted to check for changes caused by Harvey water outflow. Side-scan backscatter displays a wide intensity range, suggesting that the seafloor is covered with both fine and coarse-grained sediments, but widespread strong returns indicate that the latter dominate. Bottom grabs often returned coarse shell fragments and sand, implying that these are the main coarse sediments. Waves with widths of order 10 meters and lengths of tens of meters are common, especially in the pre-Harvey survey. These waves mainly occur in the HSC and near ridges in the central and eastern sections of the roads. The waves likely indicate mobile sand shaped by tidal currents. Strong backscatter also occurs in areas without waves, perhaps indicating another coarse sediment. The ridges occur seaward of bends in the channel, implying deposition owing to changes in flow direction. Lack of sub-bottom penetration on chirp sonar profiles is common and consistent with coarse, sound scattering sediments at the seafloor. Comparison of bathymetry data before and after the storm show no significant changes. The picture provided by the study is that Bolivar Roads is swept by strong tidal currents, leaving a base of coarse lag sediments. The Harvey water pulse swept away mobile sediments from the roads, but the seafloor was largely stable.