SAND PROSPECTS AND HYDRODYNAMIC IMPLICATIONS OF DREDGING AN OFFSHORE SHOAL IN SOUTHERN LOUISIANA, USA

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It is well documented that sand resources along the southern Louisiana coast are relatively scarce given the large volumes of sand required for restoration of the rapidly degrading barrier islands and marshes. Ship Shoal, a shore-parallel sand source offshore of the Isles Dernieres has been recently identified for restoring the adjacent barrier chains. In an effort to more accurately evaluate sand volumes that are potentially available for coastal restoration, high-resolution geophysical data were collected followed by detailed geotechnical investigations in two study areas in Ship Shoal Complex. Ship Shoal is the largest and easternmost of a series of sand shoals on the inner continental shelf of Louisiana which has its formation related to deltaic abandonment and marine transgression almost 7000 years ago. Recent geophysical and geological data indicate that sand thickness in the study area varies from 5.7m on the shoals crest to 0.3m on the seaward side of the shoal with the grain size ranging from 0.15 to 0.2 mm. Sand thickness decreases abruptly towards south compared to a more gradual decrease observed to the north and will be discussed in detail.

Oceanographic surveys were conducted along a shoal transect during spring season to understand the hydrodynamics of the shoal as well as to assess the interaction of the shoal with the wave and current climate associated with the frequent extra-tropical storms crossing the coast during the winter-spring season. An array of oceanographic instrumentation was deployed in spring 2006, at three locations along a transect through the eastern half of the shoal. Acoustic and optical sensors for measuring wave, current, water level and turbidity were attached with the tripods and the data collection was set in the burst mode with a sampling frequency of 2Hz. The meteorological data during the deployment period were collected from the WAVCIS station CSI-6. The extended survey data indicate that the wave and current regime during the winter-spring season is dominated by the frequent cold fronts. The wave current combination can re-suspend and transport the sediments from the shoal during these storms. Study reveals that the shoal is intermittently blanketed by fine grained sediments debouched by the Atchafalaya River during the spring flood season. During the extra-tropical storms a fluid mud layer is developed over the shoal which can significantly alter the bottom boundary layer dynamics and subsequently carried off by the strong currents associated with the storm.

The study demonstrates that eastern Ship Shoal mainly contained very clean sand (<5% silt) that ranged in thickness from 4 to 6 m and generally ranged in grain size from 0.15 to 0.2 mm. The sand deposits identified along Ship Shoal and South Pelto Blocks have great potential to support large-scale coastal restoration of Lafourche, Timbalier coastal segments. However, given the fact that the coast is exposed to hydrodynamic characteristics associated with frequent cold front generated storms, mining strategies should be developed to alleviate the environmental impacts associated with the sand removal.

Brief Biographical Sketch:

Syed M. Khalil is presently Geologist DCL with Louisiana Department of Natural Resources, Baton Rouge, USA. He has more than twenty years of experience in coastal and marine geology/geophysics and has been associated with coastal engineering & restoration efforts since 1995. He has authored numerous papers and professional reports and is an Associate Editor, *Journal of Coastal Research*. He was a United Nations Fellow at the University of Hawaii. Syed Khalil is a former Director of the Indian Geological Survey.