

Sediment Transport Monitoring in the Port of Veracruz Expansion Project

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Abstract : The construction of most coastal infrastructure developments around the world are usually made considering wave height, current velocities and river discharges; however, little effort has been paid to surveying sediment transport during dredging or the modification to currents outside the ports or marinas during and after the construction. This study shows a complete survey during the construction of one of the largest ports of the Gulf of Mexico. An anchored Acoustic Doppler Current Velocity profiler (ADCP), a towed ADCP and a combination of model outputs were used at the Veracruz port construction in order to describe the hourly sediment transport and current modifications in and out of the new port. Owing to the stability of the system the new port was construction inside Vergara Bay, a low wave energy system with a tidal range of up to 0.40 m. The results show a two-current system pattern within the bay. The north side of the bay has an anticyclonic gyre, while the southern part of the bay shows a cyclonic gyre. Sediment transport trajectories were made every hour using the anchored ADCP, a numerical model and the weekly data obtained from the towed ADCP within the entire bay. The sediment transport trajectories were carefully tracked since the bay is surrounded by coral reef structures which are sensitive to sedimentation rate and water turbidity. The survey shows that during dredging and rock input used to build the wave breaker sediments were locally added (2500 m^2) and local currents disperse it in less than 4 h. While the river input located in the middle of the bay and the sewer system plant may add more than 10 times this amount during a rainy day or during the tourist season. Finally, the coastal line obtained seasonally with a drone suggests that the southern part of the bay has not been modified by the construction of the new port located in the northern part of the bay, owing to the two subsystem division of the bay.

Keywords : Acoustic Doppler Current Profiler, construction around coral reefs, dredging, port construction, sediment transport monitoring,

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