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Observations of tidal and subtidal circulation in the inlet of Alvarado Coastal Lagoon, Mexico

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Abstract

Two 24-hr surveys were carried out at the entrance of Alvarado Coastal Lagoon, Veracruz, Mexico, to describe the circulation and hydrography (temperature and salinity) patterns under low and high river discharge conditions. The inlet of the Alvarado Coastal Lagoon is a microtidal rivermouth estuary located on the southwestern coast of the Gulf of Mexico and receives fresh water from one of the largest mexican rivers, the Papaloapan River. In each survey, velocity, temperature, and salinity profiles were sampled during a diurnal tidal cycle along a predetermined circuit and fixed hydrographic stations, respectively. In each survey, the circuit was completed at least twelve times during a tidal cycle, allowing us to separate the subtidal and tidal signals.
Results showed that the inlet of Alvarado Coastal Lagoon is a saltwedge estuary, where, during high river discharge, the saltwedge is removed from the estuary during most of the tidal cycle. In contrast, during low river discharge condition, the salt wedge is present during the whole tidal cycle and all along the inlet. Subtidal circulation exhibit net outflow in the cross-section entrance during high river discharge period. While during low river discharge, two-layer circulation is observed in the mean velocity signal. The water column exhibits strong vertical stratification, where the 3-m thick upper layer is occupied with fresh water, and the 5-m thick bottom layer is occupied with > 30 psu water. The upper and bottom layer are separated by 2-m thick halocline.

Biography

Hector Perales-Valdivia has expertise in physical oceanography of estuaries and coastal lagoons, developing observational work and numerical modelling of these systems.



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