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Implementation of CMS for Fringing Reef Environments

ABSTRACT

The present study evaluates the performance of the US Army Corp of Engineers (USACE) Coastal Modeling System (CMS) in fringing reef environments. CMS consists of a spectral wave model and a 2D nearshore circulation model loosely coupled to simulate waves and currents for sediment transport prediction at coastal inlets and entrances. Rough, irregular bathymetry crisscrossed with channels is common to fringing reefs and poses a challenge to numerical models. The roughness increases wave dissipation due to bottom friction and channels allow wave setup to flow offshore. This study investigates the effectiveness of CMS to model wave heights and wave setup for a range of bottom friction parameters again laboratory and field measurements from previous studies. The flume study examined waves breaking over the typical profile of a fringing reef with negligible friction loss. The predefined breaking parameters in CMS performed well for small wave conditions but under predicted wave heights for more energetic cases. The field study consisted of a cross shore transect of over a reef flat on the North Shore of Oahu. The bottom friction played an important role in modeling energy dissipation over the reef flat as well as the wave heights near shore.