Wang, L., J. Sheng, C. Hu and B. G. Hatcher. 2006. Storm-Induced Circulation on the Meso-American Barrier Reef System during Hurricane Mitch: Coupling Remote Sensing and a Nested-Grid Ocean Circulation Modelling System. Eos Trans. AGU, 87(36), Ocean Sci. Meet. Suppl., Abstract OS46N-15.

Abstract:
The main purposes of this study are to simulate circulation patterns around coral reefs of the Meso-American Barrier Reef System (MBRS) in Mexico-Belize-Honduras and to assess physical connectivity between different reefs of the MBRS. As such, the impact of short term events may be significant. Here, we study the impact of the category 5 Hurricane Mitch (1998) on MBRS circulation features using a triply nested-grid ocean circulation modelling system. The nested-grid system is based on CANDIE, a three-dimensional, z-level, ocean circulation model, and uses the two-way nesting technique based on the semi-prognostic method developed recently by Sheng et al. (2005). The nested-grid modelling system has three sub-components: an outer model covering the western Caribbean Sea, an intermediate model covering the southern MBRS and an inner model covering the coastal region off Honduras. The nested system is forced by NCEP wind stresses for the first 294 days and by an idealized storm wind forcing for the next 20 days. The nested system is also forced by the monthly mean surface heat and fresh water fluxes. The salinity and extent of estuarine waters along the northern coast of Honduras are specified based on SeaWiFS ocean color images. The nested system generates strong divergent surface currents under the storm, intense near-inertial currents in the wake of the storm, and sea surface temperature cooling biased to the right of the storm track. The system also produces a strong estuarine jet extending from the coast into the deep waters off Honduras, which is consistent with the remote sensing data obtained from SeaWiFS sea spectral reflectance observations shortly after passage of Hurricane Mitch.