Issues in Developing an Operational Forecast Capability for Coastal Waters

Cheryl Ann Blain, Catherine Edwards, Brett Estrade, and Mark Cobb

The application of a numerical model to the prediction of coastal circulation has economic advantages over the maintenance of dense and varied observational networks. A model that incorporates the range of important dynamical forcings and represents complex shorelines and bathymetry at fine scales can be exercised as a virtual laboratory for understanding the cause and effect of existing currents and subsequently for developing contingency plans under various emergency scenarios. Success of an operational forecast system depends on 1) understanding the model sensitivities to bathymetry and the relevant forcing mechanisms which are often unknown, 2) specifying appropriate offshore forcing for limited domains, and 3) crafting meaningful operational products.

The sensitivity of coastal circulation to the source and spatial resolution of wind forcing, to the temporal resolution or existence of river forcing, and to the representation of bathymetric features are characterized. Offshore forcing from larger scale ocean models as well as forcing derived via data assimilation methods is investigated. Lastly, alternative operational products are explored for presenting environmental information to the user community. These issues are all addressed in the context of the development of a forecast capability for coastal waters of the Mississippi Sound in the northeast Gulf of Mexico. The basis of the forecast system is the finite element-based, 3-D hydrodynamic model ADCIRC, driven by tides, river inflow, and wind.