

Three-Dimensional Coastal Modeling

The circulation and optical properties in coastal waters result from different forces related to impulsive events such as fronts and deep-ocean eddies. The interaction of these forces depends on seasonal changes in meteorological patterns as well as local coastal geometry and astronomical tides. Thus, simplified models of coastal flows cannot be applied in a general manner to different coastal regions. Long time series of oceanographic variables are also uncertain for evaluating numerical models of these flows because of the fundamentally different timescales for measurement of ocean variables. As a result of the nonlinear behavior of the coastal ocean, it is important to use all available data to drive numerical models of these regions.

NRL SSC's high-resolution coastal ocean modeling program is developing methods to quickly set up three-dimensional models in new areas, in what are termed re-locatable models. The spatial scales are concentrated on ranges from 1 km to less than 100 m. Timescales vary from hours to several days. These models are highly dependent on accurate boundary conditions, and supplemental work is in progress to develop research wind forecast/hindcast techniques to support the modeling effort. Model development is done in conjunction with field measurement programs sponsored by NRL and ONR. Thus, the numerical models are seen as a single component in the description of the coastal ocean environment.