Small-Scale Ocean Modeling

Although many mixing and wave-type phenomena in the ocean occur on smaller scales, they cumulatively exert strong influence on the larger ocean currents. Examples include internal waves, tides, and frontal instabilities. In coastal areas, the river discharges give rise to special buoyancy-driven motions. Depending on their horizontal/vertical scale aspect ratio, these motions can be nonhydrostatic. Their models demand the solution of three-dimensional elliptic equations with efficient numerical schemes on high-performance computers.

The NRL SSC small-scale research program involves a study of nonlinear internal waves, their interaction with large-scale currents, and the entrainment river discharges with coastal waters. We compare the model results to field and satellite observations. Research is done in conjunction with the exploratory and advanced development coastal ocean modeling programs of the Navy.