

Woods Hole Sea Grant: 2006-2008 Projects

Ocean Currents Off Cape Cod in Winter

The ocean east of Cape Cod in the western Gulf of Maine is an important area for commercial fishing and shellfishing, and lies over a shallow continental shelf and is a highly variable environment with variable ocean structure. Water masses of different densities form distinct layers in the ocean, and the layering, known as stratification, changes from season to season. A southward coastal current partly driven by freshwater runoff, flows past the tip of Cape Cod, helping determine the water characteristics and carrying and distributing the plant and animal plankton that form the base of the food chain in this commercially important coastal ocean. At the same time, the current carries both anthropogenic and natural trace materials that can be measured and tracked by sensors. Structure and stratification depend on differences in the temperature and salinity of different water masses, and the structure and circulation of Cape Cod's coastal ocean is dramatically different in summer and winter: winter cooling creates a complex set of water masses of different characteristics proceeding from the shallower inshore outward toward deeper water, with fronts forming where the waters meet and mix. WHOI physical oceanographers Glen Gawarkiewicz and Andrey Scherbina are making a detailed study of the complex conditions that form in this wintertime coastal ocean, using an innovative combination of intensive sampling with AUVs (Autonomous Underwater Vehicles) and monitoring with moored sensors. One objective of this project is to use AUV-collected and moored-sensor-collected data to describe the coastal ocean's wintertime stratification and circulation, and another is to monitor trace contaminants and possible harmful algal blooms. A third goal is to test the feasibility of prolonged routine coastal monitoring operation with AUVs launched and recovered nearshore or from the dock—a practice that would reduce the need for expensive ship time to deploy and recover vehicles, making coastal monitoring far more economical in the future. The researchers are working in cooperation with the Cape Cod National Seashore, National Marine Fisheries Service, Cape Cod fishermen's associations, and the Children's School of Science, and promote citizens' and students' awareness of the local ocean environment and its connections to the global ocean by providing results over the internet, providing an opportunity for educators to take part in surveys, and giving talks to educators and resource managers.

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