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Martha's Vineyard Coastal Observatory: Objectives

Although scientists have been involved in coastal research for decades there has been a growing focus in this area in recent years. With 50 percent of the earth's population living within a hundred miles of a coast there is increased awareness of severe beach erosion, oil spills and industrial pollution, and impacts of coastal development on nearshore fisheries. Engineers and planners have been concerned with coastal protection, particularly in heavily populated areas where wave attack, set up, and shoreline erosion threaten coastal structures. Geologists have been struggling to understand how the astonishing variety of coastal geological features form and evolve in response to nearshore processes. Coastal meteorologists are only now beginning to investigate physical processes that are unique to the coastal environment, including the adjustment of the near-surface flow to extreme changes in the surface roughness, differential heating, and extensive sea-spray production in the surf zone.

It is difficult to understand these complex and dynamic processes that occur at the interfaces where the ocean meets the atmosphere and where it meets the shore. Sampling from ships and even long-term deployment buoy systems and drifters have been limited by the amount of on-board power and/or data storage available. Continuous sampling at stable permanent platforms will, in time, give us data to clarify patterns and allow development of predictive models for interactions of phenomena such as storms, seismic events and toxic algal blooms.

Underwater observatories with real-time data and virtually unlimited power transmission capabilities (when compared to traditional oceanographic moorings) are beginning to provide scientists with continuous access to the coastal and open ocean.

The Woods Hole Oceanographic Institution (WHOI) has played a significant role in designing cabled observatories both in littoral waters and the deep ocean. The observatory's underwater node is simply a sophisticated plug strip on a fiber optic extension cord that allows divers to install instruments in a relatively simple operation. Scientists can access their data and instruments in real-time, adjusting sampling parameters based on changing field conditions.

However, for any coastal observatory to serve as a cost effective system for the collection of long-term scientific and environmental data, it must have a simple, upgradeable power and telemetry system and an instrument interface that is compatible with existing standards. It must be designed for extended environmental exposure and ease of service to avoid high maintenance costs. Most importantly, the observatory must be accessible to all potential users, from school students to scientists and engineers. This strategy was applied to the design of the Martha's Vineyard Coastal Observatory, which came on-line in June 2001 at Katama, on the south shore of Martha's Vineyard island. The new facility, and in particular its system architecture, as developed by the Woods Hole Oceanographic Institution with support from the National Science Foundation, are described.

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