



Yellow Buoys Signal Better Bay Forecasts Ahead

New system to provide real-time picture of wind, waves and water-level elevations

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Our trawler *Bright Pleiades* is trundling up the Bay off Smith Island. We're ticking off the green and red buoys that define the main shipping channel when we spot a buoy of a different color. Banana-yellow, it's embossed with four mysterious letters: CBOS.

When we reach Annapolis Harbor, there's its twin — yellow and stamped with the same letters — bobbing amongst the moored boats.

The mystery is solved across the harbor in Eastport, where Michael Koterba, a hydrologist with the National Oceanic and Atmospheric Administration, describes the Chesapeake Bay Observing System. The buoys are pioneers in a proposed network to collect comprehensive Chesapeake data and distribute it immediately over the Internet, for free. Koterba helps coordinate planning, which includes federal agencies and private entities.

What Chesapeake boater hasn't run afoul of wind and waves mismatched with the forecast. That's because virtually all Bay weather observations are made from shore.

"The instrumentation on the shore is telling you something totally different than out on the water," says Koterba. One difference is the Bay's enormous "fetch" — the distance that wind blows over the water — spanning 200 miles from north to south.

"One of our biggest problems is lack of observations on the Bay," says Tony Siebers of the National Weather Service office in Wakefield, Virginia, who has worked hard to improve forecasts. "We are counting on CBOS."

Siebers, who solicits comments from forecast users, says he has learned to have a thick skin in his business. "Boaters complain that we don't do a good job with the waves," he says.

Wave height is currently derived from the wind forecast by a computer model. On the marine radio forecast, the Weather Service also averages conditions over a forecast zone. The website offers more detailed information for local areas, including real-time radar, but it requires a high-speed Internet connection.

Back in Eastport, Koterba's computer screen displays www.cbos.org, a map of the Bay studded with six yellow buoy icons

and two weather station symbols. On this prototype site, only a couple of the yellow icons are live.

To start, the scientists want to demo the system on the main Bay and the Potomac River. At first, it will give a real-time picture of wind, waves and, to predict flooding on land, water-level elevations.

Eventually the website will feature icons reflecting local conditions: a cartoon of menacing waves indicating whitecaps and chop, for example.



Bill Boicourt, University of Maryland Horn Point Laboratory physicist, with yellow buoy that braved Bay hurricane.



Chesapeake
Winter

The challenge is to make all data accessible in one format.

When the site is fully unfurled, boaters will get basic information at a glance, with more sophisticated data clickable in detailed layers.

The system also will help to forecast and track the oxygen-depleted dead zone, sea nettles and algal blooms. It could also aid in search, rescue and recovery.

CBOS buoys are already proving their mettle. Their data helped guide sailors in last spring's Volvo Ocean Race. And when the scientific buoy in the Patuxent River stops working, "The first people who call us are the windsurfers," says Mario Tamburri, oceanographer at the Chesapeake Biological Laboratory in Solomons.

Keeping the buoys running in open waters is costly and never-ending. Any solid mass planted in the open Bay — such as an island or a lighthouse — has an ephemeral lifetime. So can a monitoring buoy, like the one battered and forlorn in the parking lot of Horn Point Laboratory in Cambridge. It belongs to Bill Boicourt, a physical oceanographer at the lab, who has been putting out scientific buoys for years. Like the Bay's screwpile lighthouses of old, ripped from their foundations by ice and carried miles away, this buoy was jerked from its station by ice in February 1996 and blown up-Bay 22 miles. Dragging along chains and two railroad wheels that had anchored it, the buoy ended up in the Choptank River near the lab that launched it.

Two other Boicourt buoys fared better in 2003 during Hurricane Isabel. One in mid-Bay off James Island and the other near the Route 50 bridge continued to work during the storm. The storm tore off the buoys' solar panels, however, and the mid-Bay buoy "walked" three miles north.

The buoys documented the Bay's reponse to Isabel, which was a scientific surprise, says Boicourt. The normal two-layer circulation — with bottom water moving north and the upper, fresher layer moving south — disappeared. Instead, the entire water mass moved north like a slab, inundating Dorchester County, Annapolis and Baltimore. When the wind passed, the unified slab sloshed back south. Data captured about currents later helped scientists refine their forecast models for future storm surges.

The CBOS system is in the mainstream of a broad scientific trend to instrument the world's coasts and oceans with sophisticated sensors taking real-time data. But it will be another five or 10 years before CBOS is fully working.



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Maryland/Virginia state line: Weather, wind and waves are a wild card out here in the Bay.