

## Ocean Observation System Helps Guide Red Tide Research

The cost of ship time for ocean exploration is often prohibitively expensive. To maximize both research dollars and time at sea, scientists rely on technology that provides information about the marine environment to help guide their efforts.

At the Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute in St. Petersburg, Florida, world-renowned red tide researcher Karen Steidinger and her colleague Cindy Heil are putting this technology, in the form of the Coastal Ocean Monitoring and Prediction System (COMPS), to good use. COMPS is an array of coastal and offshore buoys equipped with sensors to measure current, temperature, salinity, and meteorological parameters, with satellite telemetry of the data to the shore. Implemented by the University of South Florida for the eastern Gulf of Mexico, it is a component of the larger Integrated Ocean Observing System. So, how can a real-time system that gathers physical oceanographic data benefit a phytoplankton specialist? First let's look at Dr. Steidinger's research, then we'll see how the ocean observation system is helping her.

Dr. Steidinger's group is part of a national team working on a program called ECOHAB (ECology and Oceanography of Harmful Algal Blooms). In its simplest form, the goal of the ECOHAB program is to develop an understanding of the factors that trigger toxic phytoplankton blooms, locally called red tides, and determine the impacts these harmful algal species have on other organisms. In Florida waters, the predominant red tide organism is the dinoflagellate *Karenia brevis* (named for Dr. Steidinger).

Despite its microscopic size, the effects *K. brevis* have on the marine environment, and even humans, are anything but difficult to see. For example, inhalation of airborne toxins released by HABs has been blamed for large numbers of manatee and dolphin deaths in Florida waters. It has also been the cause of public health issues for beach users, especially those with respiratory disorders such as asthma. HABs even impact the world's economy because when the algal cells in a bloom die and decompose, they can rob the water of its life-sustaining dissolved oxygen. This causes a variety of sea life to basically suffocate. Aquaculture facilities and commercial fisheries suffer great economic losses, as do coastal communities that rely on tourism for revenue.

One of the lingering mysteries of the HAB story that keep scientists hard at work is figuring out how the life cycles of toxic algae like *K. brevis* influence the recurrence of blooms in the same geographic area. Harmful algal species are almost always present in low concentrations, but the factors that trigger blooms are currently unknown. Scientists want to know why blooms recur in certain areas more than others and how the blooms disperse. This will allow them to better predict and manage HAB events on the West Florida Shelf. To accomplish this goal, Dr. Steidinger's group has worked with COMPS scientists to determine how wind and current data can be used in models to predict the movement patterns of algal cells on the West Florida Shelf. Predicting the bloom movement this way guides the location of ship-based research efforts. At a cost of approximately \$3,000 per day, Dr. Steidinger's team can make the best use of limited ship time.

Thanks to a grant from the Office of Naval Research, COMPS will continue to complement the federally-funded program known as ECOHAB and expand its range with two additional moorings equipped with sensors to support Florida HAB research. Combined with sea surface temperature and ocean color data collected by USF's Remote Sensing Laboratory, COMPS and the larger Integrated Ocean Observing System are providing unprecedented opportunity to identify physical mechanisms driving the life cycles of harmful algal species.