Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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High tech ocean observations

The small electronic tags we have now developed and placed on migrating birds and the larger data recorders we have used for Elephant Seals, sharks and whales, are just two ways in which the high-tech world has invaded the ocean, allowing ocean scientists to explore, observe and monitor the oceans in ways that weren't even imagined a decade ago. Any of you sitting in front of your home computer can go on-line, 24 hours a day, and see what the ocean temperature is off Florida, what surf conditions are in Mexico, or which way the surface currents are flowing off of San Francisco.

While we have been making these types of observations for many years, the time and effort involved in the past was enormous. Until the present generation of satellites, we needed to send ships out to collect most of the information we desired on ocean conditions; but much of this has now changed. Ships are still necessary for sampling the water beneath the surface and for collecting marine life, or sediments from the ocean floor. But you no longer have to go 1000 miles out to sea and suffer days of seasickness to study the ocean. Vast amounts of information on the oceans are now collected remotely in real-time, not only from satellites, but also from shore-based observation systems, from remotely operated vehicles, and also from anchored moorings on the ocean surface and also on the sea floor.

The Monterey Bay Aquarium Research Institute (MBARI) has now placed what might be one of the world's longest extension cords across the seafloor, linking the deep ocean floor beyond Monterey Bay with the Institute 23 miles away in Moss Landing. This cable provides power and also data transmission for instruments that can be placed on the seafloor many miles offshore. We will soon be able to use this power supply and data link to support instruments that will monitor earthquakes, measure deep ocean water temperature and composition, as well as transmit high definition video over extended periods of time in locations where we were formerly limited by the life of a battery pack.

Measuring ocean currents used to require either going out to sea and putting drifting instruments in the water or setting up recording current meters in locations of particular interest. But these observations were very local, and only provided

data for the area in the immediate vicinity of the instrument or for the period of time that the ship was able to track drifters and record their positions. Not long ago, someone got the brilliant idea that there may be a better way to do this, as is often the case with many things we have done the same way for years. A shore-based system for observing ocean currents using radar on a continual basis was developed. A set of about 40 coastal stations is now nearly completed that will span the entire coast of California and that will use high frequency radar to directly measure the direction and speed of coastal currents (http://www.cencoos.org/hfrnet/). This is all part of a regional California ocean observing system (CeNCOOS-the Central and Northern California Ocean Observing System) that is focused on collecting information about the coastal ocean and making it available to the public, user groups and government agencies for practical application. The travel paths of oil or sewage spills and probable locations of missing vessels, or the occurrence and extent of harmful algal blooms are just several examples of how new technology is helping us observe the ocean nearly continuously, and can provide us with the information that allows us to make informed decisions on how to best respond to the particular problem we may be facing.