

# A Peek Inside California's Radar Network

The HF Radar team at San Francisco State University's Romberg Tiburon Center face variety, beauty & sometimes danger all in a day's work

Contributed by Jim Pettigrew, SFSU RTC



COCMP SF Bay - Gulf of Farallones Node Personnel shown (left to right): Toby Garfield, Chris Raleigh, Jim Pettigrew, Max Hubbard, Matt Gough

Through California voter-approved bond funding, the Coastal Ocean Currents Monitoring Program (COCMP) was established to measure coastal surface circulation along the whole California Coast. Initially started in 2005, COCMP is now an array of nearly 60 CODAR SeaSondes covering the whole coastal region from the Oregon border south to the Mexican border. In order to provide complete coverage, and also to offer higher resolution in areas of high potential impact from buoyant discharges in regions with high population, the network is designed as "nested" with standard and high resolution systems embedded within the broader Long-Range coverage area. The entire coast is mapped with an array of nine Long-Range (5 MHz) systems to provide 6 km resolution of

surface currents from the shore out about 180 km. Between Bodega and Big Sur and in the Southern California Bight, arrays of standard range systems operating at 12 and 25 MHz provide 3 km and 1 km resolution of the currents within 80 km of shore. In San Francisco Bay-- an area that is quite dynamic and at high risk for environmental incidents--an array of four 42 MHz SeaSondes offers 0.4 km spatial resolution for the currents in the central portion of the Bay. This high-resolution portion of network provided important current information during the response effort to Cosco Busan oil spill of 2007.

The COCMP system is subdivided into eight "nodes" each of which is responsible for the operations and maintenance of the radars in its geographic region. Our Romberg Tiburon Center (RTC), part of San Francisco State University, operates the San Francisco Bay and Gulf of the Farallones node whose coverage extends from Point Reyes, south to Pillar Point and into San Francisco Bay. The RTC node consists of 10 SeaSonde units and is the only node to include instruments operating at all the basic SeaSonde frequencies: 4-6 MHz, 12-14 MHz, 24-27 MHz, and 40-44 MHz. Operations of the RTC node are under the leadership of Toby Garfield and managed by Jim Pettigrew, with assistance from Chris Raleigh, Matt Gough and Max Hubbard.

Six units are on Golden Gate National Recreational Area properties for which U.S. Park Service been a terrific partner. We also maintain sites on properties administered by the Air Force, the Coast Guard, and the cities of San Francisco, Sausalito and Montara. These radar locations are each quite interesting. One of our Long-Range SeaSondes resides at Pillar Point directly above Mavericks , the



Point Bonita lighthouse and fog station.

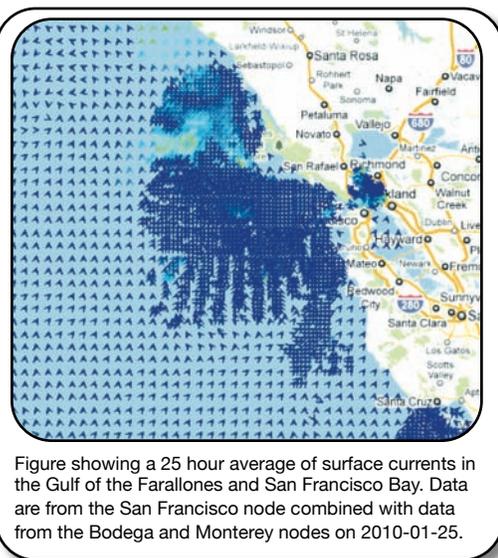


Figure showing a 25 hour average of surface currents in the Gulf of the Farallones and San Francisco Bay. Data are from the San Francisco node combined with data from the Bodega and Monterey nodes on 2010-01-25.

famed big-wave surf break, while a 12 MHz unit in Bolinas sits on the property of the historic Marconi ship-to-shore transmitter array which was built in the early 1900's. Visiting these locations offers both beauty and a little bit of history.

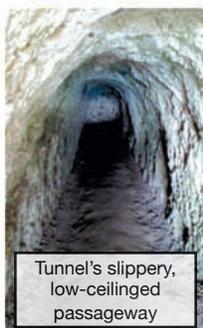
Not all locations are created equal and some pose logistical and physical challenges: Our first radar set at the Romberg Tiburon Center facility was easy to install and is conveniently accessed by stepping directly outside our office doors. In contrast, our latest site, a 25MHz unit at the Point Bonita Lighthouse and Fog Station, took several years working through bureaucracy to receive land use approvals from the Coast Guard and visiting this site is not for the faint of heart. After a long hike, then passing through a narrow tunnel with low clearance, to reach the antenna location one needs to suppress vertigo while walking on a swaying footbridge above a perilous chasm. The antenna is bolted to a ledge of pillow basalt high above surging waters and the blast of the fog horn requires ear plugs be worn at all times. The demonstration of bravery and the extra effort RTC staff make to operate at this location is justified as the radar has a 240-degree field of view and provides 1km resolution coverage of the treacherous waters of the San Francisco Bar and Golden Gate Channel.

Snapshots below highlight journey to SeaSonde location at Point Bonita Lighthouse.

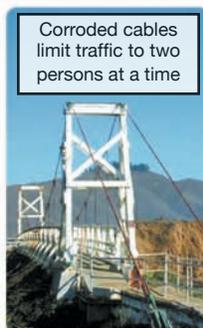
All Images provided courtesy of Jim Pettigrew, SFSU Romberg Tiburon Center



Entrance to the Point Bonita tunnel



Tunnel's slippery, low-ceilinged passageway



Corroded cables limit traffic to two persons at a time



Footbridge to Pt. Bonita Lighthouse



SFSU grad student Max Hubbard assembling radar antenna



SeaSonde antenna sits about 15m above the water