

Radio waves help track Pacific currents 24/7

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One of SF State's current-tracking radar transmitters located at Crissy Field in San Francisco.Credit: Regan Long

(PhysOrg.com) -- Along the West Coast of the United States, a network of antennas is sending radio waves out to sea 24 hours a day and capturing real-time data about the ocean's currents.

"The network allows scientists to measure ocean surface currents all the way from Washington State to Ensenada in Mexico," said Toby Garfield, professor of geosciences and director of SF State's Romberg Tiburon Center for Environmental Studies.

Garfield is part of the research consortium that created and operates the network of 78 <u>radar</u> transmitters, which is now considered to be the largest high-frequency <u>radar network</u> of its kind in the world.

Similar to a radar speed gun used by police, each shore-based antenna



sends FM radio signals that are reflected by <u>ocean waves</u> and sent back to the antenna. Changes in the signal's wavelength, caused by the movement of the ocean waves, are used to calculate the direction of the currents.

The system's real-time data on the currents in San Francisco Bay has already been used to aid search and rescue operations, help police find bodies dumped in the Bay and predict the path of the oil after the COSCO Busan oil spill in 2007.

On a larger scale, the system can measure <u>ocean currents</u> up to approximately 90 miles out to sea and along 1,500 miles of the Pacific Coast, helping scientists explore how larger <u>ocean</u> currents interact with local conditions.

One major coastal current of interest is the California Current, the southerly flow of water from Canada to Mexico that is responsible for California's fog, cold oceans and rich fisheries.

"The California Current is a general southerly flow but it's not constant," Garfield said. "It can reverse near the shore, and it has seasonal cycles. The network allows us to look at perturbations within these large currents and how those impact ecosystems, climate and humans."

SF State's Romberg Tiburon Center for Environmental Studies (RTC) operates 11 of the system's radar antennas located between Point Reyes and Pillar Point. The data are used for research conducted by Garfield and his graduate students and are also made available to the public through the NorCal Currents <u>website</u>.

The research consortium that operates the radar network reported their first observations in a paper published this spring in the <u>Journal of</u> <u>Geophysical Research</u> – Oceans, with Garfield as a co-author.



Provided by San Francisco State University

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