Coastal Ocean Currents Monitoring Program (COCMP)
in Southern California
Grant # 04-078

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Submitted to the State Coastal Conservancy by the
Southern California Coastal Ocean Observing System (SCCOOS)

INTRODUCTION

The Southern California Coastal Ocean Observing System (SCCOOS) continues the implementation of the Coastal Ocean Currents Monitoring Program (COCMP) for Southern California.

COCMP is a significant component of SCCOOS's efforts to build ocean observing and monitoring capacity for the region. This effort is augmented with federal funding to serve user needs and contribute to the evolution of a comprehensive ocean observational system for both the region and state. SCCOOS continues to coordinate with the Central and Northern California Ocean Observing System (CeNCOOS) to ensure a unified statewide system.

Program tasks include:

A. Surface Current Mapping (SCM) Array
B. Nearshore and Surf zone Observations
C. Subsurface Observations
D. Regional Ocean Modeling
E. Data Distribution and Management

This report describes second quarter activities and progress that took place in these task areas.

General SCCOOS Updates

Motivated by the growth of technical capacity and the desire to remain responsive to our user base, SCCOOS is implementing several structural changes. SCCOOS has recently established an Executive Director position, which will be responsible for engaging the Senior Advisory Committee to set regional priorities and identify new products, provide routine programmatic and financial reports, and provide representation of SCCOOS at national, state, and local venues. Julie Thomas, who has led the successful Coastal Data Information Program (CDIP), assumed this position 1 September 2008. SCCOOS will benefit from Julie's extensive experience with development of an advocacy base for wave and shoreline information. The SCCOOS executive directorship is a part time position, and Julie will be continuing in her roll with CDIP. Eric Terrill, who has provided leadership for all executive aspects of SCCOOS as its Chief Operations Officer, will transition to providing a leadership role in science and technical matters, and will remain the principal point of contact for the system components of SCCOOS including HF radar and web/data management operations. He will also continue his leadership role of COCMP's Southern California systems. Lisa Hazard will continue to work with Eric on daily operational needs of SCCOOS data and web displays as the Information Management Director.

Hiring a product development manager to work with Julie and Eric is now underway. This new hire will have cross-cutting responsibilities involving the science and data management components of SCCOOS, and will provide leadership in translating needs of the user community in identifying and developing new products and uses for the growing observing system. We have also hired a Project Assistant, Amanda Dillon, who will assist with financial and other reporting, and will handle meeting planning and executive support.

SCCOOS is overdue for a rotation of committee Chairs and officers. An appointed nominating committee, chaired by Russ Davis at Scripps, is in the process of appointing a new Chair to the Board of Governors, a new Executive Steering Committee, and a new Board Executive Committee. Other members on the nominating committee are: Jim McWilliams, UCLA; Mark Moline, CalPoly; George Robertson, Orange County & SAC; and Paul Siri, Coastal Conservancy.

The updated SCCOOS organizational chart is available at: http://www.sccoos.org/as-org.html

We have also added a links page to the SCCOOS site, including a link to COCMP, at: http://www.sccoos.org/links.html

PROGRESS REPORT BY TASK

Task A. ESTABLISH SCM ARRAY FOR MAPPING OCEAN CURRENTS

Task A.1 SCM Site Assessment

Cal Poly, UCSB, USC and SIO continued efforts on HF radar site assessments and permissions throughout the third quarter of 2008. Initially, SIO had pursued site permissions for a location in the center of Camp Pendleton. Upon review with Camp Pendleton personnel, this location was determined to be high risk due to the volume of military activity in the area. SIO staff worked in conjunction with Camp Pendleton personnel to assess other areas. During the assessment, it became apparent that deviating much further north or south from the center would introduce a gap at the opposite end. Fortunately, staff were able to identify two locations for an HF Radar installation, one on the northern end of Camp Pendleton at San Mateo and the other at the southern end at Camp Del Mar. Surface current mapping coverage off Camp Pendleton is significant and beneficial to Marine training and operations. SIO was able to obtain permissions for these two locations and installed both systems this quarter.

The Camp Pendleton, Camp Del Mar site was installed on the lifeguard headquarters in late July. Specific tasks included mounting HF radar antenna on the roof of building, mounting radar equipment enclosure in the garage of the lifeguard building, data transfer by 3G network, and minimization of interference with lifeguard communications. At this point, efforts to minimize interference on the lifeguard's UHF radio from the HF radar are ongoing, and the site is operational only during hours that lifeguard personnel are not working. The Camp Pendleton, San Mateo site was installed in early August at the San Mateo Point Overlook at the San Diego-Orange county line. Specific tasks include, siting and installation of HF radar antenna on nearby Loran tower; installation of solar power generator trailer; developing monitoring software for diagnostics of solar power system; and automating data transfer over a 3G broadband network.

USC staff have surveyed the Point Vicente area and pursued several locations for siting an HF Radar. Although, permissions and/or installation logistics rendered these locations infeasible, recently USC staff have begun discussions with area lifeguards and determined an optimal location for an HF radar. There are plans to co-locate a surface current mapping system with an

existing “watch the water” system at the Beaches and Harbors/Lifeguard facility at Torrance Beach. The current “watch the water” system is scheduled for upgrades, and plans are in place to integrate an HF radar system at that time. This location is ideal for an HF radar site, as power and communications will be available. USC staff plans to collaborate with lifeguards and “watch the water” staff in the future on this site.

Table 1. Surface Current Mapping Systems Status in the COCMP-SC/SCCOOS region

Status	Date	Affiliation	Site #	Freq	Site Name
Planned		UCSB/CalPoly	L03	5	Point Arguello
Installed	05/25/2006	CalPoly	S01	12	Point Estero
Installed	05/01/2007	CalPoly	S02	12	Diablo Canyon (old: Point Buchon)
Installed	12/01/2007	CalPoly	S04	12	Point San Luis
Installed	11/20/2007	UCSB	S06	12	Fallback 22 (Point Sal)
Planned		UCSB/CalPoly	S07	12	Point Arguello
Planned		UCSB/CalPoly	S08	12	Point Conception
Installed	10/10/1997	UCSB	S09	12	Refugio State Beach
Installed	06/09/1997	UCSB	S10	12	Coal Oil Point
Installed	04/12/2003	UCSB	S11	12	Summerland
Installed	04/01/2005	UCSB	S12	12	Mandalay Generating Station
Installed	01/01/2007	UCSB	S13	12	Nicholas Canyon
Installed	08/28/2008	UCSB	S14	12	Point Mugu
Installed	05/01/2007	UCSB	S15	12	Santa Cruz Island
Installed	09/06/2006	USC	S16	25	Dan Blocker
Planned		USC	S17	25	Point Vicente
Installed	07/01/2006	USC	S18	25	Point Fermin
Installed	11/01/2006	USC	S19	25	Dockweiler
Planned		USC	S20	25	Newport Beach
Installed	04/01/2006	USC	S22	12	Santa Catalina East
Installed	06/01/2006	SIO	L04	5	San Clemente
Installed	04/01/2006	SIO	L05	5	Point Loma Long Range (at SIO)
Installed	02/09/2007	SIO	S21	25	Dana Point
Installed	08/28/2008	SIO	S23	25	Camp Pendleton North – San Mateo (old: Oceanside)
Installed	05/01/2006	SIO	S24	25	San Elijo State Beach
Installed	07/28/2008	SIO	S25	25	Camp Pendleton South – Camp Del Mar (old: La Jolla)
Installed	02/02/2008	SIO	S26	25	Wastewater Treatment Plant, Point Loma
Installed	10/01/2002	SIO	S27	25	Point Loma
Installed	09/01/2002	SIO	S28	25	Border Field State Park
Installed	03/18/2003	SIO	S30	25	Coronado Island
Installed	09/01/2003	UABC	S29	25	UABC

Task A.2 Site Permissions

USC technician, Matthew Ragan, and SIO staff continue to pursue site permissions with the City of Newport for an installation at the end of Newport Pier. USC has provided Professional Engineer (PE) fabrication drawings as well as detailed layout drawings drafted by SIO mechanical engineer, William Middleton. The city has sent these drawings back several times, requiring more intricate details including city wiring information. Staff are responding to these requests, and continue dialog for finalizing permissions at this location.

The California Office of Historic Preservation's State Historic Preservation Officer (SHPO) on 23 July 2008, and the U.S. Fish & Wildlife Service (FWS) on 12 September 2008, gave their written concurrence to the U.S. Coast Guard (USCG) for Cal Poly's placement of SCM sites at Pts. Arguello and Conception. They now join the U.S. Air Force and Santa Ynez Band of Chumash Indians who gave the USCG their written concurrences for Cal Poly's SCM placements at the Points last quarter on 22 April 2008 and 23 June 2008, respectively. With the consent of these agencies and the successful completion of their own internal review, the USCG will be able to issue a Categorical Exemption for the SCM sites, which should allow licenses to be issued to Cal Poly for use next quarter.

Task A.3 Frequency Allocation

On 10 September 2008 the FCC dismissed SCCOOS's experimental license request #0098-EX-ML-2006. In the FCC's letter of Dismissal without Prejudice, the Chief of the Experimental Licensing Branch, Mr. James R. Burtle, states:

> *"You are advised that the Commission is unable to grant your application for the facilities requested. Coastal Ocean Dynamics Applications Radar (CODAR) is currently being reviewed for its potential as a service requiring a frequency allocation. Until a determination is made concerning this matter, an increase in the number of existing antenna locations is not being licensed at this time."*

That same day identical dismissal letters were issued by the FCC[1] in response to high-frequency radar (HFR) SCM site requests by the Central & Northern California Ocean Observing System (CeNCOOS) [file #0469-EX-PL-2006], University of California Santa Barbara (UCSB) [file #0007-EX-ML-2008], and Rutgers University [file #0482-EX-PL-2006]. Also on September 10, 2008 the FCC approved CeNCOOS's request #0060-EX-ML-2006 for modification of a preexisting HFR experimental license.

The #0098-EX-ML-2006 license was a new license submitted by SCCOOS to increase the radius of existing locations. SCCOOS maintains a pending renewal #0096-EX-RR-2007 of license

[1] To see the FCC requests Scripps Institution of Oceanography made on behalf of SCCOOS go to the website http://gullfoss2.fcc.gov/oetcf/els/reports/GenericSearch.cfm and perform a search for "Scripps" in the "Applicant Name" field; searching for "San Francisco State" as the Applicant Name brings up the FCC requests San Francisco State University has filed for CeNCOOS. Applicant Name searches for "Rutgers" and "Marine Science Institute" return results for Rutgers University and UCSB, respectively.

#0061-EX-ML-2005 submitted in May 2007. This renewal was not affected by the dismissal of #0098-EX-ML-2006.

While the need for a permanent frequency allocation for SCM HFR has long been acknowledged, these recent denials by the FCC bring into focus the need by SCCOOS to coordinate more closely with the National Oceanic and Atmospheric Administration (NOAA; viz. Dr. Jack Harlan) on any future expansion of the SCM network. Despite the apparently positive response of the FCC to selected requests regarding pre-existing licenses, it would be prudent to anticipate the eventual denial of SCCOOS's existing FCC licenses as they come up for renewal (and the need to re-calibrate via a new boat antenna pattern measurement every SCM site that changes frequency).

Frequency allocation is an ongoing concern. SCCOOS will continue to work with Dr. Jack Harlan, COCMP colleagues, and IOOS personnel to gain exclusive use of frequency bands necessary for operating ocean current-measuring radars.

NOAA Frequencies for use by HF-Radar

42MHz CODAR Systems		25MHz CODAR Systems		12/13MHz CODAR Systems		5MHz CODAR Systems	
Frequency	Bandwidth	Frequency	Bandwidth	Frequency	Bandwidth	Frequency	Bandwidth
47.5MHz	500kHz	25.4MHz	150kHz	12.100MHz	50kHz	4.55MHz	25kHz
48MHz	500kHz	25.6MHz	150kHz	12.116MHz	50kHz	4.66MHz	25kHz
48.5MHz	500kHz			12.132MHz	50kHz	4.8MHz	25kHz
49MHz	500kHz			12.148MHz	50kHz	5.375MHz	25kHz
49.5MHz	500kHz			12.164MHz	50kHz		
				12.180MHz	50kHz		
				13.450MHz	50kHz		
				13.668MHz	50kHz		
				13.690MHz	50kHz		

Figure 1. Frequencies NOAA has permitted entities participating in the Integrated Ocean Observing System (IOOS) to use for SCM (courtesy of Dr. Jack Harlan, NOAA).

Task A.4 Site Preparation and Equipment Order

SCCOOS has received all HF radars ordered for this project. SCCOOS personnel continue to purchase supporting equipment as the final sites are installed. The antenna at Dan Blocker in Malibu has been moved to the pole holding the "watch the water" camera and weather station and the cabinet has been relocated to the area next to the cabinet, following requests made by the lifeguards to relocate the antenna from the lifeguard tower. Unfortunately, when the system was powered on it caused interference with the lifeguard's camera. This was expected, and next steps include installing ferrites on the camera cable and replacing the current guy wire holding the lifeguard pole with non-metallic guy wire. UCSB personnel resolved a similar interference problem by installing ferrites. USC staff are also working on reconfiguration of a system at Dockweiler lifeguard headquarters, including the addition of a Rohn antenna tower for mounting the antenna and communications link. This link will provide communications from Dockweiler to Dan Blocker.

Technician Dan Elmore performed quarterly maintenance of the solar generator at Cal Poly's Diablo Canyon, California (DCSR) standard-range SCM site on 16 September 2008. Approximately three gallons of deionized water were needed among the eight batteries' 24

individual cells to replenish the electrolyte. Energy capture was also improved by spray washing and scrubbing the twelve solar panels atop DCSR's solar generator.

SIO representative Tom Cook has been troubleshooting the Camp Pendleton Del Mar Beach installation. Currently the HF Radar antenna is installed near the lifeguard's communications antennas. The transmit of the 25MHz signal is causing intermodulation with the lifeguard's UHF system. Since this UHF system is an integral component of the lifeguard's coordination with other law enforcement and safety organizations, troubleshooting the issue can only be done for short segments during slow lifeguard operations. Once summer had ended, troubleshooting efforts increased, and a potential cause of the problem was attributed to rusted segments of the lifeguard's UHF antenna. The next step is to replace the UHF antenna, and this will hopefully be completed soon. For now, the HF Radar system is only operational during hours that the lifeguards are not working.

Task A.5 Standard Operating Practices

SIO staff have been working with NOAA/IOOS and CODAR Ocean Sensors to generate additional radial output files that contain metadata relating to QA/QC. New metadata includes various MUSIC algorithm decision variables (eigenvalues, signal strengths, direction of arrival metrics) that can be used to determine radial quality. When the new files are available, new QC software will be developed to continuously compile statistical distributions of each decision variable. Using these distributions, the values of each variable for each radial can be categorized between "poor" and "good" quality. Radial quality metrics will then be connected to each radial for graphical display, and for further processing into current total vectors.

UCSB staff continue to work to understand how measured antenna patterns can best be routinely incorporated into algorithms for computing divergence and rotation (vorticity) of the regional circulation. Specifically, Brian Emery has continued analyzing artifacts resulting from the Multiple Signal Classification (MUSIC). This work has been somewhat slowed down by the new Pt. Mugu installation and preparations for the San Nicholas Island Installation.

Cal Poly technicians attended an 8-10 September 2008 CeNCOOS QA/QC Workshop. Based upon the analysis performed during that workshop, Cal Poly technician Dan Elmore identified selected time periods between 0000 UTC 1 July 2006 to 0000 UTC 1 July 2008 for application of the CeNCOOS QA protocol. Radial velocity measurements made by Cal Poly's SCCOOS SCM sites were reprocessed to apply enhanced calibration values (e.g., antenna patterns), 1st-order line settings, and additional range-cells.

Cyril Johnson and Brian Emery have continued experiments with various hardware configurations (i.e. setup of modems, uninterruptible power supplies, and site computers) to improve site reliability. The UCSB group is now operating its water-cooling system for HF radar electronics at the Santa Cruz Island site. So far the system has worked well and consumes substantially less power than conventional air conditioners. UCSB engineers shipped a cooling block, a key system component, to the colleagues at the Mid-Atlantic Regional Coastal Ocean Observing System (MARCOOS). The feasibility of installing the system at additional sites is under consideration.

TASK B. ESTABLISH NEARSHORE AND SURFZONE OBSERVATIONS (HB06

Task B.1 Wave and Current Observation

Data are continuing to be qa/qc'd by the performers involved in the HB06 demonstration program.

Task B.2 Transition Zone Observations – AUV, Drifter and Mooring Deployment

Surf zone measurements from AUVs, drifters, and moorings were collected during the Huntington Beach 2006 experiment. No further updates at this time.

Task B3 : Modeling wave evolution & currents to nowcast surfzone currents (Santa Monica and Huntington Beach regions)

Real-time nowcasts of surfzone waves and alongshore currents for all of Southern California are now available online at http://cdip.ucsd.edu/?moplist=Overview&pub=public&xitem=overmap; click on the desired county, and then select the desired variable from the listed "alongshore plots." These nowcasts use CDIP's newly developed MOnitoring & Prediction (MOP) system that includes both remotely generated ocean swell and locally generated seas, and bathymetry representative of each local region. The alongshore currents can be used to estimate the transport of pollution spilled into the surfzone.

Task B.4 Northern and Central Nearshore Data

Real-time Surfzone Currents: Real-time nowcasts of surfzone waves from the US-Mexico border to San Francisco have been expanded to include estimates of the mean alongshore surfzone currents. The surfzone current predictions are available in beta test mode on the CDIP website: http://cdip.ucsd.edu/?moplist=Overview&xitem=overmap. Work is continuing on the development of a public portal to the new nearshore data.

OPC Climate Change Modeling: The nearshore wave predictions model was combined with a 100-yr forecast of deepwater wave conditions to create a dataset of California nearshore wave conditions for OPC climate change studies.

Deliverable for December 2008: The temporary URL (above) will be integrated into the new CDIP "theme-based" website.

TASK C. ESTABLISH SUBSURFACE OBSERVATIONS

Task C.1 Underway CTD

During the third quarter, underway CTD (uCTD) transects across the San Pedro Channel were not possible due to the lack of a research vessel. COCMP funds are insufficient, and were never intended, for boat charter; use of vessels of opportunity was a goal of the program. Early in the

field sampling the *R/V Sea Watch* was used, but that vessel was made unavailable by a lawsuit filed by a private vessel operator. This situation affects other research vessels in the area, such as *R/V Sea World* of UCLA. We have maintained communication with marine operations personnel at USC about this situation. Overall this has been very frustrating, given all the effort put into the successful uCTD program so far. A database of all data collected to date is available at: http://www.icess.ucsb.edu/iog/uCTD/index.php

Planning continued for the Bight '08 program. A major goal of the SCCOOS Bight '08 effort will be to determine the nutrient budget for San Pedro Bay, an ocean area strongly affected by Los Angeles and surrounding coastal cities. Based on the current plan, the uCTD will be operated along two transects crossing the San Pedro Bay to resolve water properties with better resolution than conventional hydrographic sampling. Remaining COCMP funds, if not used for re-established transects across the San Pedro Channel, will support the Bight '08 field effort

Task C.2 Bight-Scale Monitoring

We have maintained continuous cross-shelf glider sampling along three CalCOFI lines for another quarter. Line 67, which runs west southwest from Moss Landing, is maintained in collaboration with Francisco Chavez (MBARI), and is representative of the strong upwelling of the central coast. Line 80, supported under separate funding from the Gordon and Betty Moore Foundation, runs west southwest from Point Conception, and includes transits from Point Conception to Monterey. This line marks out the bio-geographic boundary between the strong upwelling region to the north and the Southern California Bight where the Southern California Eddy and the intersection of poleward and equatorward flows leads to substantial eddy mixing of physical properties and biological communities. Line 90, which runs south southwest from Dana Point, crosses the center of the Southern California Eddy and passes near Catalina Island, serving as a measure of the flow in which the island-bound ecology is immersed.

Typically one glider operates on each line for 3 months before being recovered and replaced by another, thereby maintaining uninterrupted measurements. All operations this quarter were normal, except that the 30 July 2008 recovery from Line 80 could not be accomplished in Santa Barbara as usual because strong poleward flow all across the shelf forced us to go north and recover at Port San Louis, making use of facilities provide by Mark Moline (Cal Poly).

All records provide sections to 500 m depth of temperature, salinity, chlorophyll a fluorescence, acoustic backscatter strength at 750 kHz, and absolute velocity sections as measures of variations in physical conditions and the abundance and distribution of phytoplankton and zooplankton. The lines extend well into the California Current on the offshore end and into about 40-m water depth on the inshore ends. All data is available in real time through the web site spray.ucsd.edu and the SCCOOS web site.

An analysis of the first 18 months of operation on Lines 80 and 90 is reported in the paper, "Glider surveillance of physics and biology in the southern California Current System" by Russ Davis, Mark Ohman, Dan Rudnick, Ben Hodges, and Jeff Sherman, which appeared in *Limnology and Oceanography* for October 2008.

In addition to continuing sampling on the three lines above, we plan to use COCMP gliders in the Bight 08 project to assess the impact of sewer outfalls on the nutrient budget of the San Pedro Channel and, by inference, determine if outfall nutrient loading is a significant factor in harmful algal blooms. Installation of an ultraviolet spectrometer capable of detecting nitrate concentration into a Spray is nearing completion with the guidance of Ken Johnson (MBARI). We hope to have the prototype nitrate-equipped Spray glider in operation beginning December 2008.

TASK D. ESTABLISH REGIONAL OCEAN MODELING

Task D.1and D.3.2 Model Research and Development and Synthesis of SCCOOS Data and Prediction of Fields

We have completed and submitted for publication a substantial assessment of the ROMS configuration for the Southern California Bight with 1 km horizontal grid resolution for a hindcast during the period 1996-2003:

Dong, C., E.Y. Idica, and J.C. McWilliams, 2008: "Circulation and multiple-scale variability in the Southern California Bight." *Progress in Oceanography*, submitted.

The paper indicates a useful level degree of skill in simulating the statistical structure of currents, temperature, and salinity compared to data sets from High-Frequency (HF) radar data, current meters, Acoustic Doppler Current Profilers (ADCP) data, hydrographic measurements, tide gauges, drifters, altimeters, and radiometers. A tidal skill assessment is currently underway, and we are collaborating with JPL scientists to improve the HF radar measurement assimilation in their operational analysis.

Task D.2 Wind Product for use by ROM

The planned work is ongoing. As part of the model quality assurance and improvement, we have converted the operational analyses from the MM5 model to the modern Weather Research and Forecast (WRF) model. We are also engaged in an assessment of the quality of the low-cloud (stratus) component prevalent in the Southern California Bight with an eye to improving its representation in WRF.

Task D.3 Covariance and Objective Mapping using COCMP observations

Operational use of the optimal methods continues for the integrated radar analysis, including real-time particle trajectories and pollution forecasts in the Tijuana River region. A paper is in preparation describing this work.

The paper submitted on the observed response of the currents to wind has been revised and resubmitted for approval for publication in the Journal of Physical Oceanography.

Work continues on the estimation of covariance matrices for the velocity. A publication is in

preparation on the direct estimation from covariances of radial velocities, as well as one on the decomposition of the fields into wind-driven, tidal, and band-passed components, each of which has a different covariance structure.

Work continues on the signatures of coastally trapped waves propagating northward along the west coast. The statistical estimates of surface current response to surface currents have been added to those for wind as a proxy for non-local forcing effects. The goal is to separate locally and remotely wind-forced features from signatures of coastally-trapped wave propagation northward along the coast.

This work has highlighted the variable quality of wind estimates available along the coast, and Kim has been examining surface wind variability in the San Diego region using output from the COAMPS model. The ability of the wind to account for surface velocity variability is apparently a measure of its quality, and we are hoping for improved wind products as part of SCCOOS.

The paper on MITgcm 4DVAR (adjoint) assimilation of radials for the San Diego region on a 1 km grid has been revised and resubmitted.

ROMS runs on a 1km grid with observed winds continue for estimating larval dispersion, and the paper on the physical results from those runs has been accepted. Work continues on the application of the results in comparison to observations of mussel larvae.

TASK E. DATA DISTRIBUTION AND MANAGEMENT

Task E.1 Information Technology Development

SCCOOS programmers continued HF Radar network development throughout the third quarter of 2008. A new operational server was brought on-line this quarter, which reduced near-real time surface current processing times by a factor of 5. Reference guides for HFRNet Portals and Nodes were also made available this quarter in order to support a growing community of users. Two patches were deployed on the network, one resolving a database bug and the other for quality control. HF Radar network development efforts have focused on automating database management in order to improve its scalability. Four new sites were added to the network; Shelter Cove (HSU), Point Mugu (UCSB), San Mateo Point (SIO) and Camp Pendleton (SIO).

Programmers furthered development of a near real-time diagnostic page that shows advanced diagnostic information for each site within the COCMP network. The aim of this page is to provide a listing and status of each COCMP radar site organized by site affiliation. This will provide technical personnel tasked with radar performance a simple tool for diagnosis of system status. Most notable of the improved diagnostic utility is the development of plots showing radial coverage for individual sites within the COCMP network. These plots are updated hourly, and show the coverage as a percentage over a day, week and month.

SCCOOS programmers also continue to develop improved backend architecture to account for high-volume/high density data that is not conducive to RDBMS (Relational Database Management System) for long term storage and retrieval. A NetCDF cdl reader/writer class will be used to build dynamic netcdf storage files. It doubles as a min/max statistics cache and the first pass in quality control (valid range). This step utility is important because it will allow higher-level programmers to create efficient storage structures without knowing how the data will be stored. By removing the storage structure from the problem definition, an end user can outline their own dataset (e.g. this data is [1-d, 2-d, 3-d, or 4-d] and not have to worry about different storage mechanisms, or can set the valid range, *e.g.*, between 33 and 35 psu, and any samples not falling within valid range will be automatically flagged as invalid. There is a need, however, for MySQL databases for storing metadata. Programmers are examining a MySQL database abstraction class for metadata objects. It will expand the simple addition of a new metadata field to a new field to the database. The user can now create a new asset class, which is an order of magnitude more complicated than adding a field. Future development continues at the raw data, processed data and metadata level.

Task E.2 Product Development

SCCOOS personnel continue to receive positive feedback from the ports page, a theme-oriented section targeting harbor-directed activities:
http://www.sccoos.org/data/harbors/lalb/index.php. NOAA has requested that SCCOOS display this work at the upcoming "NOAA West Day," a large, multi-media educational and outreach event at the Aquarium of the Pacific in Long Beach, CA. Development of this project is heavily leveraged from the COCMP work and would not be possible without the State's investment in surface current mapping and data management system. SCCOOS plans to further the multi-layered, interactive website with input from maritime operators. Overlays currently include: 6km surface currents, wave buoys, model output (wave height, peak wave period, average wave period, and wave direction), shipping lanes, Catalina ferry path, as well as the area NOAA nautical charts. Future development includes a wind overlay and the Automatic Identification System (AIS) real-time ship information data.

SCCOOS and CeNCOOS programmers are working on several demonstrations to integrate AIS technology. On 17-19 September 2008, Cal Poly technician Dan Elmore installed an AIS system provided by the Naval Postgraduate School at Cal Poly's Pt. San Luis SCM site (LUIS). The AIS system extends the SCM network's utility as an aid-to-navigation and safety by providing data about the position of passing ships participating in the VTS program (please see http://ais3.siitech.net/VTSLite).

The Avila Community News published an article in its July 2008 edition written by Cal Poly Principal Investigator Dr. Mark Moline and technician Brian Zelenke titled "Ocean View: Real Time Measurements of Ocean Surface Current Along the Central Coast." Cal Poly's Pt. San Luis SCCOOS SCM site can be seen from the town of Avila Beach, California and has been a point of public interest for the COCMP within the community.

In August, SCCOOS Principal Investigators Eric Terrill and Libe Washburn participated on the review panel to discuss the IOOS Plan for a National HF Radar Surface Current Capability. The

meeting was held 19-21 August in Boulder, CO, and was sponsored by the NOAA IOOS Program in cooperation with the Regional Coastal Ocean Observing Systems, The Alliance for Coastal Technologies (ACT), and other federal agencies. This activity complements regional needs for developing an HF Radar State plan.