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The attached proposal is being submitted to you for your consideration by a NOAA Cooperative Institute. Should you recommend funding for this proposal, we request that the funding be transferred through our current NOAA cooperative agreement, # NA17RJ1231. The NOAA contact (described below) for this cooperative agreement should be contacted immediately if this proposal is accepted for funding.

Title of Proposal: Southern California Coastal Ocean Observing System (SCCOOS): *Shelf to Shoreline Observatory Development*

Principal Investigator(s): Eric Terrill

Proposal # UCSD 2007-1103

Period of Performance: October 1, 2007 – September 30, 2008

Funding (by year, if multi-year): $1,876,737
Task #: 3 – Individual Science Project

Theme(s): A – Climate and Coastal Observations, Analysis and Prediction Research.
This research is relevant to NOAA's Strategic Goal #1: Protect, restore and manage the use of coastal ocean resources through ecosystem-based management, #3 Serve society's needs for weather and water information and #5 Provide critical support for NOAA's mission.

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Southern California Coastal Ocean Observing System (SCCOOS): *Shelf to Shoreline Observatory Development*

Submitted in response to Federal Funding Opportunity:
FY 2007 Regional Integrated Ocean Observing System
CFDA 11.473 Coastal Services Center, NOAA
One Year Proposal
Cooperative Agreement #NA17RJ1231
Funding Requested: $1,876,737

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Table of Contents

PROJECT SUMMARY

In FY04, SCCOOS initiated the development of regional capacity for the Integrated Ocean Observing System (IOOS) in the Southern California Bight (SCB) through the Coastal Observing Technology System (COTS) program. The region is comprised of ~20 million people, representing 25% of the coastal population of the U.S., living within fifty miles of the coast. The population density raises concerns about human impacts on our environment and on how the environment, in turn, will impact the economy and societal development. Dealing with this dense population requires more effective management of the coastal ocean through more accurate and comprehensive observations, and the management and delivery of those data into useful decision making tools – a mission of SCCOOS.

SCCOOS functions as both the Regional Association (RA) and the Regional Coastal Ocean Observing System (RCOOS). Since the inception of SCCOOS, attention has been placed on developing an organizational structure that meets the needs of region. SCCOOS operates through a system of agreements between the implementers of the observing system, overseen by a Board of Governors, and Executive Steering Committee, and advised by a Senior Advisory Committee. The Senior Advisory Committee represents 18 federal, state, and local mission-driven agencies that will benefit from a functioning regional IOOS. Care has been given to managing early IOOS expectations of the Senior Advisory Committee, with technical activities within SCCOOS focused on the gathering of observations and early delivery of useful data products and decision tools. The principal goal of SCCOOS, as the regional ocean observing system, is to provide policy makers and coastal managers with improved knowledge to evaluate and design new management strategies and to manage risks. Real-time observations, model and data-based forecasts, and a flexible information distribution system provide critical information to these users.

As a science-based decision support system, SCCOOS works interactively with local, state and federal agencies, resource managers, policy makers, educators, industry, scientists and the general public to provide data, models, and products that advance our delivery and understanding of coastal observations and improve the management of the California coastal ocean environment. SCCOOS integrates data and projects from local, state, and federal and individual institutional efforts to develop an integrated, multidisciplinary coastal observatory in the SCB. This proposal will continue pilot activities begun under COTS to further the development and maturation of a functioning coastal observatory in Southern California that meets local and regional user needs and is in compliance with the standards and protocols for sharing and archiving data in support of IOOS. These efforts are conducted in synergy with funding from a NOAA/Coastal Services Center Regional Association development grant and a $21M State of California program to establish a Coastal Ocean Currents Monitoring Program (COCMP). As described herein, principal goals of this proposal are to support value-added activities that provide broad RCOOS capabilities for both short-term decision making (oil spill, search and rescue, beach water quality, storm response) and long-term assessment (climate/fisheries assessment, evaluation of management decisions).

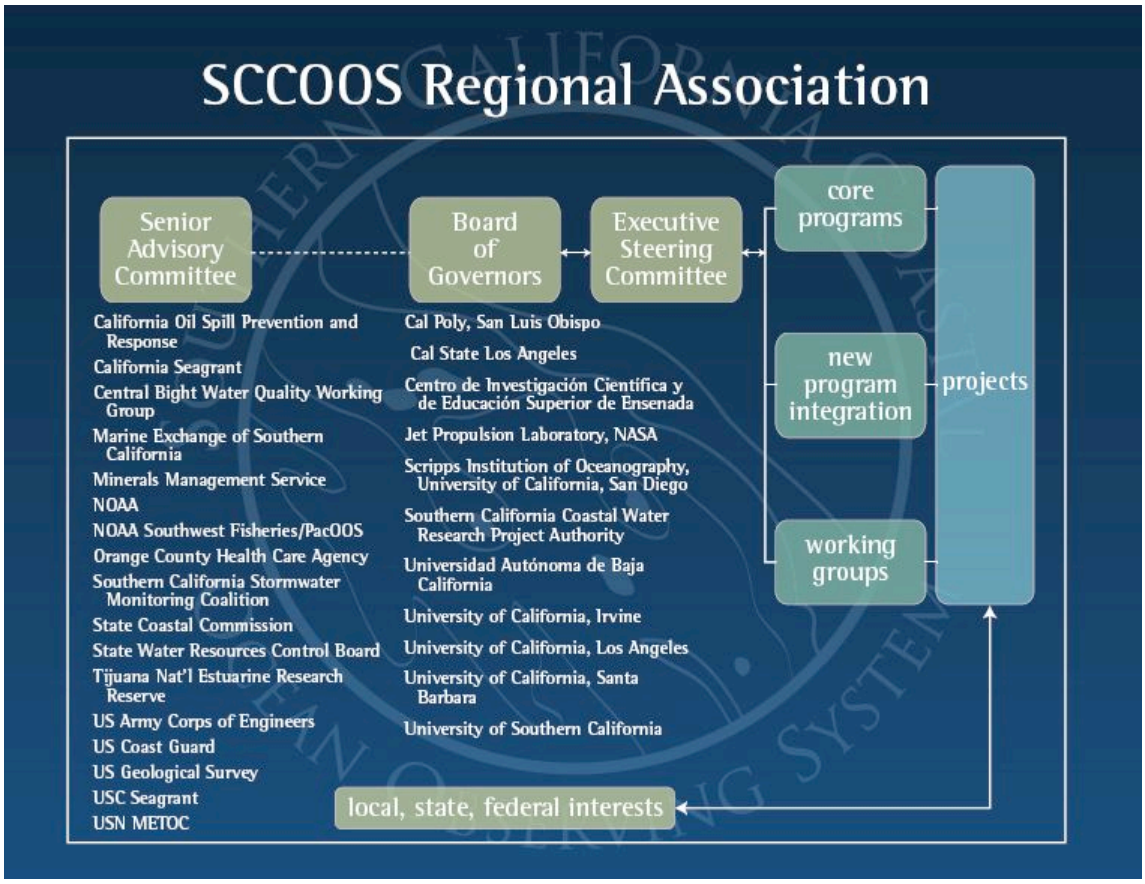

Figure 1. Diagram of the SCCOOS Regional Association / RCOOS organizational structure

PROJECT SUMMARY TABLE

Project Title:	Development of the Regional Coastal Ocean Observing Systems (RCOOS) for Southern California: Southern California Coastal Ocean Observing System (SCCOOS)
Recipient Institution:	Scripps Institution of Oceanography
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Partners:	See SCCOOS Regional Association / RCOOS organization diagram above

PROJECT DESCRIPTION

A. GOALS AND OBJECTIVES

The Southern California Coastal Ocean Observing System (SCCOOS), the Regional Coastal Ocean Observing System (RCOOS) for Southern California, makes core observations of physical, chemical, and biological variables within the Southern California Bight (SCB), integrates and distributes new and existing observations, adds new observations, and develops and distributes data syntheses. SCCOOS is working with federal, state and local data providers to form an integrated system whose output can be tuned to a broad audience of users as well as communicate data to federal data repositories. The proposed RCOOS development leverages the State of California's $21M investment in infrastructure for the measurement and synthesis of coastal ocean currents monitoring. All SCCOOS data and analyses are evolving towards publication through a data management system in as close to real time as is practical. A centerpiece of our strategy for integrating data into a coherent description is the use of data-assimilating models that combine multivariate data with dynamical constraints to produce gridded products in both hindcast, nowcast, and forecast modes. Specific technical goals for SCCOOS, as they apply to societal needs envisioned by IOOS, are described further in the proposal in the context of product lines tuned for specific audiences. NOAA funding for this project will allow a broad range of value-added efforts that leverages both the developing user structure in Southern California and the state's investment in observing system infrastructure.

SCCOOS goals and objectives include:

- Continued development of the Regional Association (RA) / Regional Coastal Ocean Observing System (RCOOS) as the regional entity in which local and regional observations are implemented, coordinated, integrated, and communicated. SCCOOS will serve as the local entry point for regional observations to national data systems, and provide broader awareness of federal backbone observations to local users. The SCCOOS RCOOS program is designed to evolve and mature with the development of the Regional Association. SCCOOS will pursue Regional Association certification when that process is formally defined.
- Conduct outreach to identify and work with end users to identify their data product needs, integrate and assimilate their data, and determine best methods for communicating results to the community.
- Provide resource managers and decision makers with science-based, mission-driven, and publicly available data and information products and decision support tools.
- Contribute to the development of a national IOOS comprised of regional and backbone assets.
- Develop, evaluate, and optimize products designed for short term decision making and long term environmental assessments.

B. BACKGROUND

Policymakers, resource managers, government agencies, and industry within the Southern California Bight (SCB) have critical information requirements for (a) observing and understanding the fate, transport, and impact of coastal discharges and impaired water quality; (b) knowing the long term environmental factors that affect managing fisheries and endangered marine species; (c) observing conditions (e.g. sea state) that

create hazards to enable early warnings and provide planning tools for safe at-sea operations; (d) monitoring the health of beaches to preserve recreational activities and provide erosion protection; and (e) observing and predicting algal blooms, specifically harmful algal blooms that kill fish, marine mammals and birds and affect tourism. These needs are especially acute in Southern California where approximately 20 million people, representing a quarter of the coastal population in the U.S., live within fifty miles of the coast. Clearly Southern California is concerned with human impacts on our environment and how the environment, in turn, will impact our economy and societal development.

SCCOOS was formed by a consortium of eleven Southern California universities and laboratories from Baja California to Morro Bay. Each organization has a history of coastal observing, ocean modeling, marine research, and development of novel sensors, platforms, and data management techniques. The consortium (http://www.sccoos.org) aims to develop and coordinate institutional efforts to create an integrated, multidisciplinary coastal observatory for the SCB.

SCCOOS is overseen by a Board of Governors, formed in 2004 and composed of senior representatives of the eleven signatories to an MOU. A significant mark of SCCOOS development is the unanimous approval of Bylaws by the Board of Governors in February 2006. As a project-based organization operating under a system of contracts and grants, the Bylaws define the functional relationships of structural components of the SCCOOS Regional Association.

The Board of Governors established a Senior Advisory Committee in February 2006, representing another important milestone in SCCOOS maturity. The Senior Advisory Committee comprises representatives of eighteen local, state and federal agencies and industry, and provides guidance and comments to SCCOOS operations, participates in strategic planning, and serves as an outside source of information and reference that links SCCOOS with broader stakeholder interests, priorities, and knowledge within the region. This efficient governance structure has been developed to foster cohesion of regional stakeholder needs and promote a unified system at both the regional and national levels in a manner that removes conflict of interest.

SCCOOS has developed a functional legal structure that permits sound and efficient means for entering into agreements and receiving/distributing funds in a manner than promotes the bottom-up exchange of ideas. It has demonstrated its functionality through management of approximately $15M in awards since its inception. While management refers to the functions of technical design, building, implementing, and operating SCCOOS, SCCOOS governance is designed to collate key decision-makers of different disciplines and participating entities so that data providers and users are instrumental in the design, operation and improvement of the product development and dissemination.

SCCOOS is administered through a NOAA cooperative agreement between the Joint Institution of Marine Observations (JIMO) and UCSD. Through JIMO, SCCOOS operates as a system of agreements / partnerships between the implementers of observing system components. The advantages of this system are: a) responsibilities and entitlements of every party are carefully laid out in work orders and proposals; b) liabilities can be imparted or limited openly and by mutual agreement; and c) individual implementers of components of the observing system that have individual business needs that are specific to their affiliation or employer organization can be accommodated.

SCCOOS is able to provide unique agreements tailored specifically to meet the needs of each of its participants or members. SCCOOS's approach eliminates the need for arduous modifications to Bylaws or for convening a corporation and negotiating its policies in order to meet the needs of its participants. To date, over a dozen agreements have been established for building SCCOOS, totaling approximately $15M. For additional information about JIMO and its capabilities, see http://jimo.ucsd.edu/overview/about_us.html.

C. AUDIENCE: THE SOCIETAL DRIVERS FOR SCCOOS

SCCOOS is on a trajectory to serve a broad spectrum of management needs. Our ability to meet these needs will be through the implementation of a set of product lines that vary in complexity and time horizons to implementation. This section presents our multi-year strategy through a description of the three basic classes of observational approaches presently underway and their associated product lines, whose continued development would be supported by this proposal.

1. Regional Climatic Time Series

The SCB supports numerous economically important commercial fisheries, including squid, sardines, anchovies, hake, mackerel and rockfish. It is a nursery for migratory fish exploited elsewhere and habitat for endangered marine mammals, birds and sea turtles. Failure of fishery management has significantly impacted local economies. Pelagic, highly migratory and endangered species are managed by the National Marine Fisheries Service (NMFS) while the California Department of Fish and Game (CDFG) manage nearshore species. Traditional marine resource management strategies are based on the biology of individual species. New strategies are required to account for effects of the ecosystem on fish and the effect of the fishery (how fish are captured) on the ecosystem. This goal is captured in NOAA's first mission goal for the 21st century: "to protect, restore and manage the use of coastal and ocean resources through ecosystem based management" (http://www.osp.noaa.gov/goalspr.htm). Modern managers must define and characterize essential fish habitat, document habitat changes driven by ocean climate and human impact, relate fish recruitment to changes of the physical and biological environment, and minimize the impact of the fishery on other protected marine populations (e.g. endangered marine mammals or birds).

Over the last 54 years, the SCB has been a test bed for ecosystem-based fisheries management through the California Cooperative Oceanic Fisheries Investigations (CalCOFI), a state-federal partnership. Using quarterly surveys, CalCOFI characterizes the physical, chemical and biological aspects of the ecosystem and provides time series of abundance for hundreds of fish species by counting and identifying fish larvae and eggs taken in plankton tows. These data were essential in the recent closure of the SCB shelf to bottom fishing, in creating a large cowcod conservation area, and in reopening the sardine fishery when the stock reached 20,000 tons.

CalCOFI time series show clearly that the coastal ecosystem responds to climate variations and NMFS is now defining the essential fish habitat for economically important fish populations using environmental variables such as temperature, phytoplankton biomass, and primary and secondary production (c.f., SPACC/IOC Study Group, 2002). SCCOOS will focus on documenting changes in fish habitat including (a)

nutrients and primary production, (b) water column characteristics (e.g. temperature) that influence ecosystem behavior, (c) circulation that affects larval dispersal and retention, and (d) egg and larval abundances to characterize recruitment success when making stock assessments. SCCOOS augments these efforts by (a) adding observations of nearshore species and processes, (b) providing more frequent and complete description of the water column habitat, and (c) developing and validating products to describe parameters relevant to SCB fisheries.

California is presently faced with several ecosystem management issues including Marine Protected Areas, zero stormwater discharge sites in nearshore Areas of Special Biological Significance, and impacts of once-through power plant cooling. While each of these topical areas is receiving attention from task management task forces, a unifying need of both these state and federal ecosystem management issues is a need for adequate characterization of the ocean's climate. This information will be required for implementing and assessing the performance of any new management strategy as driven by the need to separate the impact of the management change from climate variability.

To meet these needs, SCCOOS is developing an ability to characterize ocean climate change at what are believed to be the appropriate regional scales. The strategy includes in-situ sampling efforts (augmentation to CALCOFI) complemented by continuation of observations of the physical environment provided by transects using gliders equipped with CTD and ADCP, HF radar derived surface maps, synoptic maps of ocean color, SST, and sea surface height generated by remote sensing, and expanded ocean sampling provided by the NDBC buoys and SCCOOS moorings. These data gathering activities will be complemented by historical ocean climatology derived from cast data from CALCOFI (offshore) and regional National Pollutant Discharge Elimination System (NPDES) permit holders (in-shore). The SCCOOS approach for interpreting these disparate observations is through the data assimilating Regional Ocean Modeling System (ROMS) that constrains the model output by data and physics.

2. Near real-time products for water quality, search and rescue, oil spill response, harmful algal blooms, marine operations

A second class of product lines is based upon the gathering, interpretation, and digital publication of near-real-time observations. This class of products under development is directed towards the 'first responder' community who make decisions based upon present ocean conditions and short term forecasts. This community includes local health agencies, discharge agencies, USCG, OSPR, NOAA HAZMAT, USN, and commercial marine traffic. Relevant data collection activities include real-time surface current maps from HF radar, computations of trajectories to estimate the fate and transport of constituents, meteorological observations and forecasts, operation of real time ocean moorings for ocean state variables and dynamic wave properties, and the management of data from outside sources including bacteria indicators measured by health agencies.

Water quality: Beach usage in California is higher than in the other 49 states combined, with 175 million users spending over $1.5 billion annually on tourism. Clean beaches and coastal waters are central to the region's economy and lifestyle. Sources of marine pollution in the SCB are numerous: sewage outfalls and spills; runoff from rivers and storm drains; industrial waste; offshore dumpsites; and discharge or spills from coastal

vessels. The California Water Resources Control Board and its nine Regional Water Quality Control Boards regulate all discharges to state waters and administer EPA permits. Permit holders are required to monitor coastal waters, typically for water column properties (salinity, temperature, optics properties), benthic sampling of biota and chemicals, toxicity, and bacteria that indicate contamination by human waste. Dischargers collectively spend $32M/year (Schiff et al., 2002) in compliance-based monitoring in the SCB.

Goals for SCCOOS are to develop data and models that describe and predict the fate of ocean discharges from point sources, storm water runoff events, spills and dredging. This will assist in developing permit requirements and in enforcement. Data driven models will allow the determination of flushing rates to quantify pollutant residence time as it affects beach closure times and assess the regional capacity of coastal waters to accept increasing discharges and the associated ecological impacts. These activities will provide water quality managers and policy makers with a better scientific basis for evaluating the effectiveness of management strategies and prioritizing water quality infrastructure improvements.

Public health agencies monitor shoreline waters for health risks using indicator bacterial species whose analysis takes 24-72 hours. Analysis of ocean data and development of models will allow the development of complementary real-time indicators of water-quality risk based on continuously observed parameters including in-situ and remotely sensed optical properties, in-situ salinity, and ocean transport. Indicators will be tailored to support targeted adaptive sampling within existing agency monitoring activities.

Harmful Algal Blooms: In the U.S., the impact of harmful algal blooms (HABs) is estimated to exceed 500 million dollars annually (Anderson et al., 2000), including mass fish deaths and losses to commercial fisheries, decreased tourism, and public health costs. This does not include less easily measured environmental effects, such as kills of marine birds and mammals. California is increasingly experiencing blooms of toxic algae (Trainer, 2000) and blooms of non-toxic algae that produce anoxic conditions and fish kills. The California Department of Fish and Game (CDFG) has authority to close beaches and fisheries in response to the outbreak of HABs and to warn other users of nearshore waters (aquaculture, recreation) of the danger. But even though HABs have serious environmental and economical impacts in the SCB, information about toxin-producing populations remains limited. Local agencies and California Department of Health Services (CHS) have enacted a monitoring program for several species, but the sampling scale is too coarse to be of immediate use and is jeopardized by recent state budget cuts.

SCCOOS goals for HABS are to: (a) develop an environmental context for the monitoring of state and local agencies that will allow them to use efficient adaptive sampling; (b) characterize fields of phytoplankton biomass based on in situ and remote observations; and (c) combine these data to predict the likelihood of blooms of harmful species. Data will be relayed to the CHS to facilitate their monitoring and to local agencies to avert or mitigate local harmful effects (e.g., public warnings, use of alternative water supplies by aquaculture) as well as to avoid unneeded actions.

***Marine Weather**:* The SCB is an active area for shipping, fishing, recreational boating and near-shore water sports including swimming and surfing. These marine activities are all affected by ocean surface waves. Even large-ship users, such as ferry operators, oil transportation, and commercial fishing, are significantly affected by sea state. Waves and currents are a risk to human life for small boaters, swimmers and surfers. Strong surfzone currents, often exceeding 1 m/s (2 knots), are hazardous to swimmers, and there are over 5000 lifeguard water rescues each year in the City of San Diego alone. Even shoreline development can be threatened by waves. Timely and accurate warnings and forecasts of sea state, swell and surfzone currents are essential for addressing these conditions.

National Weather Service coastal-buoy sea-state measurements are used by the NWS to forecast waves. With state and federal funding, the Coastal Data Information Program (CDIP) at SIO operates a network of 17 wave stations and produces wave predictions along the California coast. Data from this program are used and distributed by the NWS, while CDIP wave predictions are available through its web site (http://cdip.ucsd.edu), which averages over 40,000 daily users. SCCOOS's goals are to (a) improve nearshore wave forecasts, (b) develop the ability to predict strong nearshore currents, (c) integrate these predictions within the SCCOOS data system. (d) provide high-resolution meteorological wind forecasts using COAMPS.

Erosion and storm response: The estimated value of beach-related tourism exceeds the combined value of commercial fishing and ports (King, 1999). Erosion of sandy beaches reduces tourism and opens natural cliffs and shoreline development to storm-wave damage. Many beaches and cliffs in the SCB are eroding steadily, and dredging is the primary tool for restoring beach sand. Effective beach management depends on understanding the pace of erosion, assessing what sand resources are available, and knowing that fine sediments from the dredging site will not smother important habitats. SCCOOS goals here will be to provide data on (a) changes of beach sand level, (b) offshore sand resources and their changes, (c) seafloor habitats (supporting the Living Resource component 3.C), and (d) climatological and real-time nearshore currents (as in 2.D above) for predicting sediment plumes.

SCCOOS will integrate ongoing surveys of beach sand level. Two to four airborne Lidar surveys are made each year from the cliff or sea-wall to the water line between Pt La Jolla and Dana Point (approximately 80 km) as part of the Southern California Beach Processes Study. Additional beach surveys in the surfzone circulation project will extend coverage from the high-water line to about 6-m depth. Interested stakeholders in the region include beach managers and Non-Governmental Organization (NGOs) like San Diego Association of Governments, California Department of Boating and Waterways, U.S. Army Corp of Engineers, California Coastal Coalition, and the California Shore & Beach Preservation Association.

Oil Spill and Search and Rescue: Southern California coastal counties lead the state in toxic spills. California's Office of Spill Prevention and Response (OSPR, 2002) reported that in 2002 a total of 2,262 spill incidents affected California's inland waters and the Pacific Ocean. Four counties along the SCB were among the top five statewide spillers, reporting over 1000 incidents. A mature SCCOOS should expect to deal with two incidents per day. Increasing energy-use places the SCB at higher risk for offshore oil

spills. Of particular concern in the SCB is lightering between Very Large Crude Carriers and smaller shuttle tankers and the potential siting of a Liquefied Natural Gas (LNG) terminal for a new electric power plant near Rosarito Beach, just a few miles south of the U.S. border. Search and rescue operations are frequent in Southern California as a result of high levels of commercial and recreational boating, the growth of cruise liners, and the numerous coastline airports that use over-water approaches. The SCCOOS goal for ocean spills and for search and rescue is to provide operational real-time fields of the wind and near-surface currents that drive spill motion at sea. Development of search and rescue products will be coordinated with the USCG, port districts, and the large number of local marine safety offices on our coast. Data will be transmitted to national data centers designed for accepting and dispersing near-real-time observations (NOAA NDBC and USCG).

3. Intensive Regional Observations

As a result of SCCOOS end user and stakeholder engagement to provide environmental data and analysis for management decisions, an issue that has increasingly presented itself is the need to provide rapid response to unplanned events. Examples include accidental pollutant discharges, determining the sources, fate, and transport of red tides, and multi-agency sampling events and planning programs such as the Bight 08 water quality survey that are not yet defined and difficult to plan for 12 months in advance. While SCCOOS has the technical and data management base to support these programs, requests are often difficult to meet due to lack of allocated resources. In an effort for SCCOOS to be more responsive to its regional stakeholders, SCCOOS is working to provide a rapid response capability that would allow a focused observing campaign and data interpretation effort to take place. We expect this type of proactive planning, and execution of specialized projects will pave the way for the development of new and innovative products. Two examples of SCCOOS-wide efforts similar to that proposed as part of the special sites effort are HB06 and the Hyperion discharge event.

An example of SCCOOS's work in preparing for rapid response events was the Huntington Beach 06 (HB06) demonstration project conducted Fall 2006. This major nearshore and surfzone observing system was conducted in the San Pedro Bay area due to its chronic water quality problems and availability of historic data. The demonstration examined factors affecting nearshore transport and mixing of pollutants and tested models of simulated pollutant dispersal. Of particular importance was the role of nearshore currents in the transport of contaminants out of the Santa Ana River. Objectives of the demonstration were to improve predictive capability for transport in the nearshore region, improve pollutants management, and foster generation of a variety of products for coastal managers. Components of the demonstration included surfzone currents, transport, and modeling, AUV mapping, nearshore drifters, and nearshore moorings. Augmenting components were HF radar, remote sensing, offshelf gliders, pier-based sensors, ROMS modeling. SCCOOS developed a web site (http://www.sccoos.org/projects/hb06/) to serve as both a data portal and to make readily available demonstration information. While initiated through State of California funding, the project received broad stakeholder support from additional agencies including the Orange County Sanitation District, NOAA, USGS, Office of Naval Research, local lifeguards, and industry.

In November 2006, SCCOOS responded to a request by the City of Los Angeles to provide environmental data support for a planned discharge event. The City of Los Angeles Environmental Monitoring Division diverted discharge November 28-30, 2006 from the 5-mile pipe of the Hyperion Treatment Plan to a one-mile outfall off the coast of Santa Monica Bay to allow inspection of the longer outfall pipe. The discharge was estimated to approach 875 million gallons during the three-day diversion event.

SCCOOS assisted the city in designing an extensive monitoring plan to protect public health, comply with NPDES permit requirements, track effluent plume, and assess any environmental impacts. Surface current maps, derived from an array of HF radars, were used to assist in tracking the discharge plume offshore of the beaches. Wave-driven currents within the surf zone were forecasted to provide estimates of effluent movement. The research vessel R/V Seaworld conducted boat-based tracking of the discharge plume, in addition to phytoplankton and nutrient sampling. Remote sensing data from satellites were made available to optically track the spatial extent of the discharge's surface plume. Up-to-date wind and rain observations and forecasts also were conducted. SCCOOS developed a comprehensive project web site to provide up-to-date ocean environment information to assist coastal managers during the event, and was applauded for rapidly providing a transparent, public view of the ocean conditions during the event. (http://sccoos.ucsd.edu/projects/hyperion/)

SCCOOS will develop these regional intensive efforts through the present governance structure of the RA/RCOOS. A non-inclusive list of preliminary topics that has been discussed include: Development of a pilot program related to Marine Protected Areas and regional climate change, beach storm response and prediction, ocean sampling to complement funded epidemiological studies designed to examine linkages between Oceans and Human health, a pilot program to examine fate and transport (and forecasted impacts) of the four major publicly operated treatment works, developing a SCCOOS-wide effort to participate in the regional Bight survey, and development of a unified harmful algal bloom monitoring program to link human health impacts to the genesis and transport of the blooms.

D. APPROACH

Funding from RCOOS development funding will span observations of velocity, atmospheric winds, ecological fields, waves and surfzone currents, and the management of data from SCCOOS observations in addition to the aggregation and integration of variables provided by the greater SCCOOS user community in Southern California. Data will be published to national data centers where appropriate.

The following tasks described briefly below will be supported by this proposal. In an attempt to communicate how these proposed tasks integrate with the broader SCCOOS RCOOS enterprise, Appendix E describes in detail their context and the product lines on which they relate.

Tasks proposed for this proposal:

- Three (3) oceanographic moorings (bio-physical-chemical systems with optics, temperature, salinity, nitrate, ADCP) located offshore Santa Barbara, Santa Monica, and San Diego. One mooring presently reports in realtime to NDBC, with the other

two to move to real-time upgrades in FY07.

- Cross-shelf glider transects designed to constrain ocean climate models designed to assist fisheries and PACOOS efforts.
- A rapid response capability of drifters, AUVs, and glider deployments. These systems are used in focus area studies to complement the regular operation of radar and their validation, and are used to support oil and other spills. SCCOOS drifters are used by MMS, discharge agencies, and the California Office of Spill Prevention and Response.
- Data assimilating ocean model development efforts that are scheduled to move to proto-operational real time operation in FY07.
- Two (2) long-range HF radar operated by SCCOOS and whose data is delivered to NDBC. These systems complement the short range HF radar systems supported by the State of California.
- Nearshore biological surveys that extend CALCOFI measurements closer to the coast to support assessments required for once through power plant cooling and to define baseline biological variability for the planned network of Marine Protected Areas.
- Surfzone current forecasts and model developments used for tracking stormwater and predicting erosion by stormwater districts and sanitation districts (Orange County Sanitation District).
- Data management and product development/delivery efforts for SCCOOS observations, including the integration of historical data sets and monitoring data collected by local mission agencies.

E. BENEFITS

The work funded by this grant will continue development of an ocean observing system that will benefit the public good by combining and improving the existing ocean observing monitoring activities from Point Conception to the San Diego/Mexico border to the seaward extent of the Exclusive Economic Zone. This system will provide data products to interested users and to enhance our ability to: detect and forecast oceanic components of climate variability, improve the health of marine environments, facilitate safe and efficient marine operations and reduce marine hazards, protect human lives, improve national security and assist national defense and homeland security efforts, predict environmental changes and improve our understanding of environmental changes, manage resources for sustainable use and to improve protection of species, preserve and restore healthy marine ecosystems, assist coastal and marine commercial industries with information to improve business management concerning, for example, fisheries, aquaculture, mariculture, energy production and mineral management, provide scientific basis for resource management decisions, mitigate natural hazards, improve public health, and educate the public about the importance of coastal and marine environment.

SCCOOS is designed to address public and commercial needs. SCCOOS will improve public education and health and will assist economies related to coastal and marine industries, particularly tourism and the continued production of marine-related goods. Furthermore, as a regional component of IOOS, SCCOOS will contribute to developing the nationwide ocean observing system, with a standard backbone of

observations, as well as provide the inshore component of the west coast-wide, fisheries-based Pacific Coastal Ocean Observing System (PaCOOS).

Existing and future users of SCCOOS, including the Senior Advisory Committee, are identified below:

Fisheries/Ecosystem: NOAA NMFS, California Department of Fish & Game, California Ocean Protection Council, California Ocean Science Trust, State Coastal Conservancy, California Ocean Science Applications Program, PacOOS, State and Regional Water Quality Control Board, Tijuana National Estuarine Research Reserve.

Water Quality, including HABS: The six county Departments of Environmental Health within Southern California, NPDES permit holders including POTW and stormwater districts, Central Bight Water Quality Working Group, Southern California Stormwater Monitoring Coalition, Southern California Coastal Water Research Project and their member agencies, Tijuana National Estuarine Research Reserve.

Marine Weather and Waves/Erosion: US Army Corp of Engineers, California Department of Boating and Waterways, regional metropolitan working groups including SANDAG, AMBAG, BEACON, US Navy METOC, Minerals Management Service, USGS, US Coast Guard.

Oil Spill: Ports of San Diego, Long Beach, and Los Angeles, Port Hueneme, California Office of Oil Spill Prevention and Response, NOAA HAZMAT, US Coast Guard, maritime industry.

Search and Rescue: US Coast Guard, local marine safety offices, Port districts, the Marine Exchange of Southern California.

F. MILESTONE SCHEDULE

ABBREVIATED MILESTONE SCHEDULE (see individual work statements in Appendix for details)

Program Component	
MOORINGS participants: UCSB, UCLA, SIO	Maintain multidisciplinary moorings, test/evaluate new sensors.
DRIFTERS participants: UCSB	Continue drifter operations, use to assess CODAR and compute sub-CODAR grid dispersion. Deploy at SCCOOS regions of interest. Validate codar products.
NEARSHORE OBSERVATIONS participants: CDIP, SIO	Continue to operate surf-zone circulation model, deploy instruments at additional sites with complex topography. Product generation.
GLIDERS and AUVs participants: SIO, CalPoly	Begin glider operations off Los Angeles. Maintain operations in San Diego. (See figure for locations). Continue REMUS operations in areas of interest.
DATA ASSIMILATION and MODELING participants: JPL, UCLA, SIO	Continue data assimilation development activities. Continue ROMs operation, develop and distribute data products
LONG RANGE CODAR participants: SIO	Continue operation of CODARS and real-time distribution of data, evaluate performance against drifters, continue product generation efforts
REMOTE SENSING participants: JPL, SIO	Continue acquisition of satellite data, distribution of data, product generation. Provide region of interest time series analysis
DATA MANAGEMENT / INFORMATION DISTRIBUTION participants: JPL, SIO, SDSC, SCCWRP	Continue data integration and data system development efforts. Broaden product user base. Include modeling products at UCLA, SIO, and JPL.
LIVING MARINE RESOURCES participants: SIO, CALCOFI	Continue CALCOFI leg inshore, integrate data with discharger CTD data, measurements of phytoplankton biomass and primary production.
SHORE STATION MAINTENANCE participants: SIO, UCLA, UCSB	Continue maintenance and data integration. Establish protocols for manual, pier-based chlorophyll, nutrient, and HAB sampling.
EDUCATION AND PUBLIC OUTREACH participants: COSEE, Ocean Institute, SCCWRP, SCCOOS at-large	Expand school distribution of the 5th grade SCCOOS science curriculum. Hold workshop to begin educator training and dissemination of information.
RAPID RESPONSE PROGRAM SUPPORT	Respond when necessary to environmental events defined by stakeholder/user interest (e.g. – accidental discharges, opportunistic sampling programs that would benefit from leveraging of SCCOOS. Programmatic direction provided by stakeholder input to Executive Steering Committee.

G. PROJECT BUDGET

Budget By Cost Category

a. Salaries & Benefits	478,478
b. Fringe Benefits (included in salaries)	-
c. Travel	27,166
d. Equipment	84,713
e. Supply and Materials	123,605
f. Contractual:	
Subawards	178,120
Multi-Campus Awards	347,386
Subcontracts	43,696
g. Construction	-
h. Other:	
Ship Time	305,594
Other (Tuition Remission & Lab Support)	115,015
i. Total Direct Costs	1,703,773
j. Indirect Costs (16%)	172,964
k. TOTAL COSTS	1,876,737

BUDGET JUSTIFICATION

Salaries/Benefits: SIO Salary recharge rates are used for calculating salaries. The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with university policy. Fringe benefits are not shown separately, but are included in the salary cost category.

Travel: Cruise and field experiment travel is included as well as maintenance of sensors and moorings, organizational, and data management meetings. Travel to conferences to present results of this work to the science community is also included.

Ship Time: At sea experiments and mooring maintenance will be carried out on UNOLS ships and costs are included in individual budgets provided in Appendix A.

Equipment: Costs are fabrication of Gliders and Moorings are included as part of the SCCOOS instrumentation. Purchase of a Seacat mooring sensor is included to upgrade the SCCOOS moorings.

Supplies: Various project specific supplies and expendable materials are included to perform the work proposed. These include such items as calibration charges, maintenance and repairs, laboratory and cruise supplies chemicals, computer materials, and peripherals, networking services, small boat services, technical shop services, sensors, software licenses, and communication costs.

Contractual: Multi-campus awards, subawards, and subcontracts are included in Appendix A and grouped together on the 424A. Statements of work, detailed budgets, and justifications are provided.

Other: Graduate Student Tuition Remission, UNOLS ship costs, and the MPL Support Cost. Under the Graduate Student Research Tuition-and-Fee Remission (GSRTF) Program at the University of California, all Graduate Student Researchers employed at 25% time or more for any one-quarter have their tuition and fees paid as a prerequisite of employment. Ship time is justified in Appendix A. Other costs for the proposed program consists of Laboratory Support Services that are calculated at 22% of the MPL/JIMO direct salary cost. This direct charge was approved in February 1991. A more detailed explanation of these costs is provided in the budget justifications in Appendix A.

Indirect Costs: Indirect costs are calculated with a base overhead rate of 16% of total direct costs less tuition remission and equipment. The date of the most recent indirect cost agreement was 5/28/04. The cognizant agency for the University is the Department of Health and Human Services. The contact is Robert S. Klein located at 50 United Nations Plaza, Suite 347, San Francisco, CA 94102-4918.

APPENDIX A

Project Budget
Statements of Work, Budget Justifications, and Detailed Budgets

Listed in order by:
SIO Principal Investigators (alphabetical)
Multi-Campus Awards
Subawards
Subcontracts

PROJECT BUDGET

Activity	Project Work Area	Principal Investigator	Amount Request
Ecosystems	CalCOFI Alongshore Sampling, Biomass & Primary Production.	Ralf Goericke	$93,236
	Santa Monica Bay Shipboard Surveys	Keith Stolzenbach	$31,957
Data Management	Observation System Design, Quality Assurance, Quality Control	Russ Davis	$11,292
	Data Management/Web Operations	Eric Terrill	$76,211
	Data Management for assimilating model	Yi Chao	$26,687
	Optimized surface currents and trajectory product development	Bruce Cornuelle	$50,825
Educational and Outreach	Web-based Education & Outreach	Cheryl Peach	$9,984
	Outreach for Students	Harry Helling	$43,696
Autonomous Vehicles	Gliders	Dan Rudnick	$86,182
	REMUS AUV deployments at special sites.	Mark Moline	$30,000
	LA Basin/Shelf glider	Burt Jones	$35,000
Ocean Modeling	Ocean Assimilation & Modeling.	Yi Chao	$73,433
	Surf Zone Modeling	Bob Guza / Fedderson	$79,888
	Model Development	Jim McWilliams	$53,715
Ocean Moorings	San Diego Multidisciplinary Mooring	Uwe Send	$140,000
	Santa Barbara Multidisciplinary Mooring	Grace Chang	$140,000
	Santa Monica Bay Multidisciplinary Mooring	Keith Stolzenbach	$110,000
Remote Sensing	Maintenance of Near-Realtime interface to Po.DAAC	Ben Holt	$13,000
	Time Series Products	Greg Mitchell	$20,925
Long Range HF Radar	Complete LR HF radar installation, validate, calibrate, integrate data	Eric Terrill	$80,333
	Drifter Correlation	Carter Ohlmann	$11,714
Shore Station Program	Automatic shore stations, nutrient and chlorophyll sampling	John McGowan/ E. Venrick, Eric Terrill	$46,000 $54,000
Special Sites Program	Rapid Response Program Support	Terrill	$558,659
TOTAL			$1,876,737

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Cornuelle
Period of Performance: October 1, 2007 - September 30, 2008

Dr. Bruce Cornuelle and Ibrahim Hoteit will work with a graduate student and the CODAR group to produce an optimized surface current product from the CODAR and in-situ observations. This will build on the objective mapping already in process as well as the modeling of the San Diego region. Covariance matrices have already been constructed from the vector currents produced by the default processing. These suffer from problems of missing data and ill-conditioned conversion from radials.

We will estimate the u,v covariance matrix directly from the radials to make optimized maps in the regions with sufficient data. Since different physical processes have different covariances, and we expect seasonal changes in the statistics, quite a lot of data is required for reliable covariance estimates. The covariance matrices should include the time dimension, which will improve the continuity of the output estimates. In regions with insufficient data for purely statistical covariance estimation, kinematic and dynamic constraints (limiting divergence or enforcing partial agreement with the momentum equations) can be added to the dataset as "soft" constraints within the objective mapping. The limiting case of these constraints is assimilation of the radials into an ocean model, which we have begun to experiment with. This can take the form of either construction of space-time covariance matrices from the model for use in the mapping or direct assimilation of the radials using the adjoint of the ocean model.

The mapped currents can be compared to independent observations, including surface drifters deployed in the CODAR region. Comparison of the drifter trajectories with those calculated from the CODAR will provide an important check on both the surface current estimation and the calculation of trajectories from the mapped currents.

UCSD # 2007-1103

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: CORNUELLE
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
B. Cornuelle Researcher	7/07	15,078	12.00	2.98%	0.36	5,392	5,392
I. Hoteit Asstistant Project Scientist	7/07	7,242	12.00	12.50%	1.50	10,863	10,863
S. Yong Kim Graduate Student Researcher	7/07	3,857	12.00	24.22%	2.91	11,209	11,209
				Total person months	4.76		
						SALARIES AND BENEFITS TOTAL	**27,464**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **6,042**

TUITION REMISSION

	rate	# months	total
FY 07/08	1,473	4.5	6,629

TUITION REMISSION TOTAL **6,629**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	500
Project Specific Costs (Recordable CDs, tapes, etc. in support of research)	1,416
SUPPLIES & OTHER EXPENSES TOTAL	**1,916**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
AGU Meeting					
RT SD/San Francisco, CA	$ 233			2	$ 466
Car rental/Ground Transportation		$ 25	3	2	$ 150
Per Diem		$ 212	3	2	$ 1,272
Registration Fee		$ 395		2	$ 790
				TRAVEL TOTAL	**2,678**

TOTAL DIRECT COSTS **44,729**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate	
Tuition:	*6,629*			
Equipment:	*0*	38,101	16.0%	6,096
Excluded from Indirect	*6,629*			

TOTAL INDIRECT COST **6,096**

TOTAL AMOUNT REQUESTED **50,825**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Cornuelle
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Salary funds are requested for Bruce Cornuelle to coordinate the effort and work on the technical details of the covariance estimation and current and trajectory products. Funds are also requested for Ibrahim Hoteit to set up the model runs and work on the model-derived covariances and assimilation. Graduate student Sung Yong Kim will join the team for half time and will evaluate the methods and maps, and implement the estimation within the routine products for the web, including the near-real-time estimates. The remainder of Kim's salary and tuition remission will be supported on another Cornuelle research project.

Salary recharge rates are calculated for actual productive time only. The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy.

Project Specific Supplies
Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Travel
Funds are requested for Cornuelle and Hoteit to attend the AGU meeting in San Francisco to present results of this research to the science community.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Davis
Period of Performance: October 1, 2007 – September 30, 2008

Dr. Russ Davis will monitor data flow and quality from the SCCOOS observational components and coordinate efforts between the various groups to facilitate creation of the data foundation for product development. As chair of the SCCOOS Executive Steering Committee, he will organize and participate in internal management and review efforts and apply performance standards to the different components. He will serve as a contact point for NOAA and user agencies to interface with the pilot observing system.

UCSD # 2007-1103

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: DAVIS
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
R. Davis Researcher	7/07	21,054	12.00	3.06%	0.37	7,731	7,731
				Total person months	0.37		
						SALARIES AND BENEFITS TOTAL	**7,731**

LABORATORY SUPPORT SERVICES	**22% of Total Labor less Overtime	**1,701**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	202	
Project Specific Costs (Recordable CDs, tapes, etc. in support of research)	100	
SUPPLIES & OTHER EXPENSES TOTAL		**302**
TOTAL DIRECT COSTS		**9,734**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate		
Tuition:	*0*				
Equipment:	*0*	9,734	16.0%	1,558	
Excluded from Indirect	*0*				
TOTAL INDIRECT COST					**1,558**
TOTAL AMOUNT REQUESTED					**11,292**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Davis
Period of Performance: October 1, 2007 – September 30, 2008

Salaries

Dr. Russ Davis will spend approximately one-third of a month of his time on this research project's activities as outlined in his statement of work for the period of October 2007 to September 2008.

Project Specific Costs

Project specific costs that include telephone tolls, voice and data communication charges, photocopying, faxing, postage, and other miscellaneous research supplies are requested. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Goericke
Period of Performance: October 1, 2007 – September 30, 2008

Observational Activities

CalCOFI Alongshore Observations: Funds are requested to extend the October 2007 CalCOFI cruise by one day to allow us to add an alongshore transect to the CalCOFI cruises. The cost is 1 day of ship time on the R/V New Horizon (negotiations are underway to add one day to each of the cruises on the NOAA vessel Jordon) and 1 day sea time for the 4 CalCOFI technicians who will make the measurements at these stations. Along the transect we will make 9 CTD casts and make measurements of temperature, salinity, irradiance, fluorescence, backscatter, and measure concentrations of Chl a and taxon-specific pigments by high-pressure liquid chromatography.

Bio-optical Proxies for Phytoplankton Biomass and Primary Production: Funds are requested to continue bio-optical observation on the CalCOFI cruises at CalCOFI and SCCOOS nearshore stations. The bio-optical package consists of a standard CTD, 7 channel irradiance sensor, three angle/three wavelength backscattering meter, 3 transmissometers (red, green and blue) and a Chla/CDOM-fluorometer. These instruments will provide us with information related to phytoplankton biomass, particle shape and size, light attenuation and fluorescence by chlorophyll a for all CalCOFI and SCCOOS stations. The CalCOFI group will provide us with concentrations of chlorophyll a at the standard CalCOFI stations and the alongshore transect stations and rates of primary production at ~16 stations.

Data Products and Algorithms:

Nearshore Data: The data from the nearshore stations will be processed and distributed as in the past; i.e. be processed and merged with the CalCOFI data and distributed in conjunction with these. This year we will further pursue the differences in nitrate concentrations observed at the inshore CalCOFI and SCCOOS stations.

We will begin the comparison of phytoplankton and larval fish community structure between inshore CalCOFI and SCCOOS stations. By the end of this year we will be able to make 42 pair wise comparisons between SCCOOS and adjacent CalCOFI stations. This number should give us sufficient statistical power for this type of analysis. Since the phytoplankton assemblage varies strongly with total phytoplankton biomass in the SCB we will be looking for differences in community structure by testing for differences in the expected (relative to SCB data) and actual contributions of individual populations to total biomass at SCCOOS stations. We will also directly compare community structure at adjacent CalCOFI and SCCOOS stations. Technicians from NOAA's SWFSC have enumerated fish larvae in all net tows taken at SCCOOS stations. This year we will analyze these data, in collaboration with Dr. B. Watson from the SWFSC, to determine if communities of fish larvae differ substantially between inshore CalCOFI stations and SCCOOS stations. The hypothesis to be tested is that these are indeed different due the to presence of shallow-bottom populations, e.g. some rock fish populations, and

that therefore the SCCOOS station work is a good tool to monitor their populations (via larval abundance). We have had discussion with California Department of Fish and Gish (CDFG) to use samples collected at these stations to monitor lobster larvae. This may come to fruition over the next year as well.

Bio-optical Work: This year we will be focusing on finalizing work on algorithms for the estimation of Chl *a* from measurements of Chl-fluorescence and ancillary data (region, time of the day, time of the year, irradiance) along the lines presented in our annual progress report. We will similarly work on algorithms for the estimation of phytoplankton community size structure. For this work we first need to develop a metric which describes the size structure of Chl a given the 6 measurements taken per sample. The standard approach – slope of the log-transformed values – does not work in our case since we do not have continuous or near continuous distributions. A simple and robust metric would be the contribution of the > 8 μm to total biomass. Others will be explored. Once a metric has been established we will relate this to the normalized slope of the scattering of red, blue and green light at an angle of 150° and determine if this proxy for phytoplankton size distribution covaries with our metric for the size distribution. This year we will further develop simple algorithms for estimating primary production. Simple algorithms are proposed, because buoys currently deployed only have simple bio-optical measurements, e.g. irradiance, fluorescence, and concentrations of nitrate.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: GOERICKE
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
R. Goericke Research Oceanographer	7/07	10,299	12.00	8.33%	1.00	10,295	10,295
J. Wilkinson Programmer/Analyst III	7/07	8,876	12.00	0.83%	0.10	884	884
D. Wolgast Staff Research Associate III	7/07	7,955	12.00	0.83%	0.10	792	792
F. Ramirez Staff Research Associate II	7/07	6,452	12.00	0.83%	0.10	643	643
J. Sheldon Staff Research Associate I	7/07	4,463	12.00	0.83%	0.10	445	445
K. Stanaway Staff Research Associate I	7/07	4,122	12.00	0.83%	0.10	411	411
M. Roadman Staff Research Associate I	7/07	4,122	12.00	42%	5.00	20,612	20,612
Overtime/Remote Location Allowance							12,606
				Total person months	6.50		
						SALARIES AND BENEFITS TOTAL	**46,688**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **7,498**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges				1,440	
Bio-optic and Community Structure Measurements Supplies				7,217	
(Sensor Calibration and Maintenance, Lab and Cruise Chemicals, etc.)					
Project Specific Computer Maintenance				900	
Ships/Research Platforms					
R/V New Horizon	1	days @ $	14,690 /day	14,690	
Technical Services Support:					
R/V New Horizon	1	days @ $	1,569 /day	1,569	
				SUPPLIES & OTHER EXPENSES TOTAL	**25,816**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*	
OW Monterey, CA-San Diego, CA	$ 187			2	$ 374	
					TRAVEL TOTAL	**374**

				TOTAL DIRECT COSTS	**80,376**
INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)					
Tuition:	*0*	Base	OH Rate		
Equipment:	*0*	80,376	16.0%	12,860	
Excluded from Indirect	*0*				
				TOTAL INDIRECT COST	**12,860**
				TOTAL AMOUNT REQUESTED	**93,236**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Goericke
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Dr. Ralf Goericke is the Investigator responsible for this component of this SCCOOS project.

Salary is requested for Goericke (1 mo.) to supervise the component. Funds are also requested for the CalCOFI staff: Jim Wilkinson, Dave Wolgast, Fernando Ramirez, Jennifer Sheldon, and Kahryn Stanaway (.10 mo. each) to perform work at sea associated with the SCCOOS alongshore transect. Salary is requested for Megan Roadman to collect data at sea, assist in processing hydrographic and optical data and process samples collected on CalCOFI cruises.

Salary recharge rates are calculated for actual productive time only (except for non-faculty academic sick leave, which is charged as direct). The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy. As required to meet project objectives, separate rates for remote location allowance or premium overtime costs will be used.

Project Specific Supplies and Other Direct Costs
Bio-optical and Community structure measurement supplies: Funds are requested for sensor calibration charges and costs for their maintenance. Funds are also requested for laboratory and cruise chemicals, and supplies such as glass fiber filters, HPLC columns, chemicals and solvents for pigment analysis, computer materials, supplies, and peripherals, and various other expenses ranging from disposable vials to pigment standards.

R/V New Horizon Ship Time and Resident Technician Time: We are requesting 1 additional day of ship time on the R/V New Horizon to extend the October 2007 CalCOFI cruises by one day to accommodate the SCCOOS alongshore transect.

Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Travel
Funding is requested for two one-way trips from Monterey to San Diego for the return of two CalCOFI staff members who will disembark the ship in northern California.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Guza/Feddersen
Period of Performance: October 1, 2007 – September 30, 2008

1) HUNTINGTON BEACH ANALYSIS: Nearshore waves, currents, temperature, and bathymetry were observed continuously at Huntington Beach, California for about 30 days during the HB06 field experiment. Our component of HB06 was designed to answer the question; "Does our real-time nowcast system provide the correct direction and speed of surfzone alongshore currents at the study site?" Results are preliminary, but the answer is clearly "YES". Support is requested to

* quality-control COCMP-supported HB06 surfzone (shoreline to 4 m depth) observations
* compare swell wave predictions with observations from the Huntington Beach buoy, deployed in 22m depth for about 18 months
* extend wave nowcasts to include the obliquely-incident, sea-breeze generated short waves that appear to sometimes reverse the direction of surfzone alongshore currents.
* tune adjustable model parameters to best-fit the observed HB06 alongshore currents
* examine the sensitivity of the alongshore current model to errors in bathymetry (poorly known at sites not surveyed regularly)

2) WEBSITES:

* post the results of wave and current model testing and development on our website
* continue operation of our site (http://cdip.ucsd.edu/hb06/)
* incorporate lessons learned at HB06 in alongshore current models being developed for Santa Monica Bay and San Pedro Bay.

3) IMPROVED SURFZONE OBSERVATIONS:

* develop, in our existing surfzone data acquisition system, the capacity to monitor continuously the concentrations of chlorophyll and rhodamine dye.

The transport and dilution of rhodamine dye was observed during HB06. Rhodamine, a conservative tracer and proxy for pollution, was released under a range of wave conditions, as both concentrated "patches" and continuously for a few hours. Dye concentrations were obtained from bottle samples, with a fluorometer-equipped jetski, and with fluorometers mounted on instrument frames. Fluorometers were also used to measure Chlorophyll concentrations, as part of a complementary Sea Grant supported study. In HB06, each fluorometer was self-contained, with about 60 hr battery life. Fluorometer turnarounds interrupted the month-long data set creating data gaps, and were labor intensive and condition dependent. Battery costs were substantial, and one fluorometer flooded (each turnaround increases risks of mechanical failure). The proposed engineering work will dramatically reduce fluorometer turnarounds in future

deployments. Temperature and optical transmissivity observations, useful for a range of purposes, can be included in the data stream with minimal additional expense.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: GUZA/FEDDERSEN
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
R. Guza Professor	7/07	0			0.00		No Salary Requested
F. Feddersen Asst. Research Oceanographer	7/07	7,634	12.00	8.33%	1.00	7,631	7,631
M. Spydell Postdoctoral Scholar	7/07	4,508	12.00	8.33%	1.00	4,506	4,506
W. Boyd Pr. Development Engineer	7/07	12,298	12.00	8.33%	1.00	12,293	12,293
W. O'Reilly Sr. Development Engineer	7/07	12,057	12.00	4.17%	0.50	6,033	6,033
B. Woodward Sr. Development Engineer	7/07	10,805	12.00	8.33%	1.00	10,801	10,801
J. Wanetick Programmer Analyst IV	7/07	11,652	12.00	1.67%	0.20	2,335	2,335
J. Thomas Programmer Analyst IV	7/07	12,003	12.00	4.17%	0.50	6,006	6,006
C. Olfe Programmer Analyst III	7/07	7,029	12.00	6.25%	0.75	5,272	5,272
			Total person months		5.95		

SALARIES AND BENEFITS TOTAL **54,877**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **12,073**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	952
Computer Supplies	372
Project Specific Computer Maintenance	595

SUPPLIES & OTHER EXPENSES TOTAL **1,919**

TOTAL DIRECT COSTS **68,869**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate	
Tuition:	*0*			
Equipment:	*0*	68,869	16.0%	11,019
Excluded from Indirect	*0*			

TOTAL INDIRECT COST **11,019**

TOTAL AMOUNT REQUESTED **79,888**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Guza/Feddersen
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Drs. Robert T. Guza and Falk Feddersen are the co-Principal Investigators.

Dr. Guza, Dr. Feddersen (1 mo.), Matt Spydell (1 mo.), and William O'Reilly (.5 mo.) will organize and quality control the HB06 data, and compare model predictions with observations. Jerome Wanetick (.2 mo.) will provide systems support. Corey Olfe (.75 mo.) and Juliana Thomas (.5 mo.) will integrate model improvements into the appropriate websites. Brian Woodward and William Boyd (1 mo. each) will integrate fluorometer, transmissivity, and temperature data into the shore-powered data acquisition system.

Scripps Institution of Oceanography partially supports the salaries of Professors, Associate Professors, Assistant Professors, Researchers, and Associate Researchers, but makes no specific commitment of time or salary to this particular research project.

Salary recharge rates are calculated for actual productive time only (except for non-faculty academic sick leave, which is charged as direct). The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy. Staff overtime or remote location allowance may be required in order to meet project objectives, and separate rates are used in those cases.

Project Specific Supplies
Funds are requested for computer maintenance and supplies. Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Mitchell
Performance Period: October 1, 2007 – September 30, 2008

This effort will be led by Dr. Greg Mitchell and Mati Kahru of the Scripps Photobiology Group.

The SIO remote sensing component will focus on three areas:

- Generation of advanced ocean color data products on an *operational* basis. This includes ocean color derived Chlorophyll-a, Primary Production, and Export Production. These data products to be produced at 4 km spatial resolution and averaged over 8-day intervals. Averaging over several days is necessary because cloud cover severely reduces useable data on daily images. These data will be integrated with the in-situ efforts of the living marine resource observing components to assist in the development of ecosystem management techniques.
- Generation of time series of a number of selected areas using satellite data at 1 km resolution. In order to reduce the amount of missing data due to clouds these would be merged products from several satellites (Aqua-MODIS, Terra-MODIS, SeaWiFS and possibly others). The time series can be constructed from standard variables like Chlorophyll-A concentration and sea-surface temperature. Time series regions of interest to be determined with input from SCCOOS scientists.
- Provide these updated time series to the SCCOOS web and data operations group.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: MITCHELL
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
G. Mitchell Research Biologist	7/07	0			0.00		No Salary Requested
M. Kahru Specialist	7/07	11,545	12.00	10.42%	1.25	14,436	14,436
				Total person months	1.25		
						SALARIES AND BENEFITS TOTAL	**14,436**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **3,176**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	200	
Computer Supplies	102	
Project Specific Computer Maintenance	125	
SUPPLIES & OTHER EXPENSES TOTAL		**427**
TOTAL DIRECT COSTS		**18,039**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate		
Tuition:	*0*				
Equipment:	*0*	18,039	16.0%	2,886	
Excluded from Indirect	*0*				
TOTAL INDIRECT COST					**2,886**
TOTAL AMOUNT REQUESTED					**20,925**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Mitchell
Period of Performance: October 1, 2007 - September 30, 2008

Salaries
Dr. Greg Mitchell, PI, will oversee this component of the project.

Funds are requested for Mati Kahru, Specialist, who will maintain the data server and archival systems, provide the online interface, and continue operational product generation.

Scripps Institution of Oceanography partially supports the salaries of Professors, Associate Professors, Assistant Professors, Researchers and Associate Researchers, but makes no specific commitment of time or salary to this particular research project.

Salary recharge rates are calculated for actual productive time only. The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy.

Project Specific Costs
Funds are requested for computer maintenance and supplies. Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Peach
Period of Performance: October 1, 2007 – September 30, 2008

Eric Simms will be dedicating his time to facilitating SCCOOS scientists' and graduate students' participation in various outreach activities including, but not limited to, reviewing educational materials related to SCCOOS, presenting public lectures on SCCOOS research and contributing to activities that make SCCOOS data available to student and teacher audiences. Cheryl Peach, PI, will work with Eric to link to members of the IOOS network of science educators.

UCSD # 2007-1103

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: PEACH
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
C. Peach SIO Director, CACOSEE	7/07	0			0.00		No Salary Requested
E. Simms Academic Coordinator	7/07	6,548	1.00	100%	1.00	6,548	6,548
				Total person months	1.00		
						SALARIES AND BENEFITS TOTAL	**6,548**

LABORATORY SUPPORT SERVICES — **22% of Total Labor less Overtime — **1,441**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	150
Presentation Materials	260
SUPPLIES & OTHER EXPENSES TOTAL	**410**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
SCCOOS Organizational Meetings RT SD/Los Angeles, CA Car Mileage (234 miles @ $.445/mile)		$ 104		2	$ 208
				TRAVEL TOTAL	**208**

TOTAL DIRECT COSTS	**8,607**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate	
Tuition:	*0*			
Equipment:	*0*	8,607	16.0%	1,377
Excluded from Indirect	*0*			
TOTAL INDIRECT COST				**1,377**
TOTAL AMOUNT REQUESTED				**9,984**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Peach
Period of Performance: October 1, 2007 – September 30, 2008

Salaries

One month of salary is requested for Eric Simms to serve as the SCCOOS Education and Public Outreach coordinator. Working with Cheryl Peach, COSEE CA PI, Eric will be responsible for coordinating SCCOOS researcher participation in a range of EPO activities including, but not limited to, reviewing educational materials related to SCCOOS, presenting public lectures on SCCOOS research and contributing to activities that make SCCOOS data available to student and teacher audiences. Peach will be supervising Eric's activities at no cost to the project.

Project Specific Supplies

Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Costs are also included for presentation materials.

Travel

Mileage is requested for two round trips to Los Angeles to attend SCCOOS organizational meetings.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Rudnick
Period of Performance: October 1, 2007 – September 30, 2008

This component of SCCOOS is responsible for glider operations. One glider equipped with sensors to measure conductivity, temperature, and depth (CTD), and fluorescence, will be acquired during this project period. This glider will be used to continue to build out the southern California glider array. Attention for this year will be focused on CalCOFI line 90, which is the line with the most historical data.

The gliders will be programmed to profile from the surface to as deep as 500 m, while gliding horizontally at a speed of about 0.25 m s^{-1}. The resulting data resolution will be approximately 3 km in the horizontal and 5 m in the vertical. Sections will be completed every 30 days, resolving mesoscale variability of importance to the ecosystem. Data products will include sections of temperature, salinity, and plankton, and depth-average velocity. Glider data will be processed on a daily basis, posted on the web, and made available to other components of SCCOOS. In particular, glider data will be part of the SCCOOS data assimilation stream.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: RUDNICK
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
R. Davis Researcher	7/07	21,054	12.00	1.25%	0.15	3,158	3,158
D. Rudnick Professor	7/07	10,632	3.00	5.00%	0.15	1,595	1,595
				Total person months	0.30		
						SALARIES AND BENEFITS TOTAL	**4,753**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **1,046**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges					466	
Project Specific Costs (Recordable CDs, tapes, etc. in support of research)					371	
Glider Sensor					1,616	
IDG Engineering Support	142	hrs. @	$ 83	/hour	11,786	
IDG Technical Support	140	hrs. @	$ 47	/hour	6,580	
Ships/Research Platforms						
R/V Saikhon with helmsman	4	days @	$ 1,109	/day	4,436	
					SUPPLIES & OTHER EXPENSES TOTAL	**25,255**

EQUIPMENT (or equivalent and includes sales tax)

Fabrication of Gliders:						
	3	@	$ 15,999	/each	47,997	
					EQUIPMENT TOTAL	**47,997**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*	
RT SD/Los Angeles, CA						
Car Mileage (234 miles @ $.445/mile)		$ 104		4	$ 416	
Per Diem		$ 181	2	4	$ 1,448	
					TRAVEL TOTAL	**1,864**

			TOTAL DIRECT COSTS	**80,915**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

Tuition:	*0*	Base	OH Rate	
Equipment:	*47,997*	32,918	16.0%	5,267
Excluded from Indirect	*47,997*			
			TOTAL INDIRECT COST	**5,267**
			TOTAL AMOUNT REQUESTED	**86,182**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Rudnick
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Funds are requested for Drs. Dan Rudnick and Russ Davis (.15 mo. each) to oversee all facets of the work from acquisition of the glider through field operations, data analysis, and the preparation of final data products.

Project Specific Costs
Communication costs have been included for voice and data communications charges that are directly related to the individuals working on the project. Supply and expense items categorized as project specific are for expenses that specifically benefit this project, and are reasonable and necessary for the performance of this project.

One Seapoint Fluorometer Sensor is included in the budget. Costs for this sensor are based on a quote from the manufacturer. Engineering and technical support from IDG are budgeted for integration of the WetLabs sensor on the glider, preparation/refurbishment of glider, deployment and recovery, and initial data reduction.

Rental costs for the boat R/V Saikhon are also included in the budget. The R/V Saikhon is a 26-foot aluminum research vessel specifically designed for glider operations, and operated by IDG. The daily rate covers all costs associated with operating the boat, including helmsman, fuel, and maintenance.

Equipment
Gliders equipped with CTD are included in the budget. The Instrument Development Group (IDG) at SIO will fabricate the gliders. The glider costs are based on IDG's considerable experience designing and building oceanographic instrumentation.

Travel
Travel is budgeted for glider operations and field operations to be performed off the coast of Los Angeles.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Send
Period of Performance: October 1, 2007 – September 30, 2008

The Del Mar mooring will be maintained with a sensor arrangement similar to the current design and serviced regularly. Complete mooring swap out will be carried out once during a single 1-day cruise on the R/V Sproul. Shorter small-boat visits will be used for servicing individual sensors accessible from the surface.

As agreed recently by the SCCOOS mooring working group and approved by the SCCOOS Executive Steering Committee, funds will be used gradually over time to unify the sampling at the three SCCOOS moorings in order to jointly address the science and applied issues in a coordinated way. For the proposal period addressed here, we therefore plan to purchase an additional Seacat with oxygen and chlorophyll sensors to increase the vertical resolution, and to buy a first set of radiation sensors.

Overall the mooring will then sample: T/S, oxygen, fluorescence, at three depths, as well as nutrients, radiation and currents from a downward-looking ADCP at the surface. The bio-optical and nutrient sensors will be serviced by small boat trips every 2-3 months.

All data from all instruments will be transmitted in real time and converted to scientific units. In order to make this more coherent between the three SCCOOS mooring operators, we will migrate from direct RF links to cell phone internet technology. This makes data and instrument access easier from the lab computers and allows easier sharing of approaches between the three groups. Data telemetered will include a meteorological package (wind velocity and direction, air temperature), (2) acoustic Doppler current profiles of ocean velocity and direction, (3) temperature and conductivity sensors, (4) dissolved oxygen sensors, (5) fluorometers for chlorophyll *a* concentration, (6) radiation data, and (7) a nutrient sensor. The sensors deeper in the water column will be accessed with inductive modem technology. After receiving the data on shore, and performing some QC and calibrations, they will be passed on to the central SCCOOS data system for archiving and dissemination via the SCCOOS web pages.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: SEND
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
U. Send Professor	7/07	14,923	12.00	4.17%	0.50	7,467	7,467
G. Passalacqua Graduate Student Researcher	7/07	3,898	12.00	10.66%	1.28	- 4,986	4,986
G. Chavez Graduate Student Researcher	7/07	3,898	12.00	10.66%	1.28	- 4,986	4,986
D. Alden Assoc. Development Engineer	7/07	9,437	12.00	8.33%	1.00	- 9,433	9,433
T. Semingson Jr. Development Engineer	7/07	4,940	12.00	16.67%	2.00	- 9,882	9,882
C. Begler Staff Research Associate	7/07	4,464	12.00	16.67%	2.00	- 8,930	8,930
				Total person months	8.06		
						SALARIES AND BENEFITS TOTAL	**45,684**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **10,051**

TUITION REMISSION

	rate	# months	total
FY 07/08	1,473	4	5,892

TUITION REMISSION TOTAL **5,892**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges					2,000	
Project Specific Costs (Batteries, Instrument Supplies, Laboratory Supplies)					6,144	
Project Specific Computer Maintenance					792	
Computer Facility Charges					792	
Equipment Calibration					1,600	
Diving Costs:						
Physical Examination, Certification, Class, Insurance					450	
Diving Gear and Supplies					600	
Stakebed Truck Rental	2	days @	$ 150	/day	300	
Ships/Research Platforms						
R/V Robert G. Sproul	1	days @	$ 9,827	/day	9,827	
R/V Saikhon with helmsman	4	days @	$ 1,109	/day	4,436	
Technical Services Support:						
R/V Sproul	1	days @	$ 1,283	/day	1,283	
					SUPPLIES & OTHER EXPENSES TOTAL	**28,224**

EQUIPMENT (or equivalent and includes sales tax)

Fabrication of Mooring:						
IDG Engineering Support	108	hrs. @	$ 83	/hour	8,964	
Mooring hardware (wire, chains, anchor, etc.)					3,434	
Radiation Sensors (Downwelling and PAR Radiation)					6,465	
Cell Phone Telemetry Modems (Including Antennae)	2	@	$ 3,000	/each	6,000	
Seacat with Oxygen and Fluorometer					11,853	
					EQUIPMENT TOTAL	**36,716**

TOTAL DIRECT COSTS **126,567**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate	
Tuition:	*5,892*			
Equipment:	*36,716*	83,959	16.0%	13,433
Excluded from Indirect	*42,608*			

TOTAL INDIRECT COST **13,433**

TOTAL AMOUNT REQUESTED **140,000**

Budget Justification
NOAA Proposal
PI: Send
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Funds are requested for Dr. Uwe Send to oversee the project and supervise the graduate students. Funds are also requested for engineering and technical staff, and a research associate. Graduate student G. Passalacqua and engineer T. Semingson will do the mooring and sensor preparations, D. Alden, engineer, will implement the new data telemetry, C. Begler, staff research associate, will implement the real-time data processing and provision to the SCCOOS data system, and graduate student G. Chavez will assist with calibrations, quality control, and data analysis. The remainder of the graduate students' salary and tuition remission will be supported on another Send research project

Salary recharge rates are calculated for actual productive time only. The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy.

Project Specific Supplies and Other Direct Costs
Project specific costs that include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage are requested. Additional supplies needed to perform the tasks for this project are batteries, instrument supplies, nutrient analysis, cruise supplies, mooring preparation supplies, and tools required for mooring preparation and shipboard work. Laboratory supplies include necessary hardware, chemicals, and cleaning supplies used in pre-cruise instrument preparation and post-cruise instrument work. Instrument test calibrations and instrument preparation costs are also included. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Computer facility and maintenance charges are for computer support, hardware, project related software, peripherals, and computer supplies necessary to meet project objectives.

Diving costs (physical, certification, training classes): Funds are requested for a portion of the annual diver certification fees, diver physical examination expenses, bi-annual re-certification and training classes as required to meet OSHA, AAUS, and Scripps Dive Program requirements. Diving costs are estimated at $150 per diver per day. Three trips with one external diver will be performed as part of the mooring service trips. Costs are also included for dive gear replacement and supplies, which are estimated to be $100 per diver per day for the three dives (2 divers).

Stake bed truck rental is required for two trips (SIO, La Jolla to Marine Facility, Pt. Loma for the turnaround cruise and Marine Facility, Pt. Loma to La Jolla for the recovery cruise) and is estimated at $150 per day, 2 days.

One day of R/V Sproul time is requested for swap-out of the mooring. Since a separate buoy and spare sensors will be available by then, the entire operation (recovery and redeployment) can take place with a single day of ship time.

Four instrument maintenance trips are planned for the SCCOOS mooring. Each trip requires 1 day of small boat time. Funds are requested for the R/V Saikhon, which is available through SIO.

Equipment

Funds are requested for the fabrication of the mooring to be swapped out on an annual basis. This mooring fabrication includes the equipment for the data telemetry which will be transitioned to cell phone internet technology. The fabrication further includes a set of radiation sensors. These and an additional Seacat instrument are required in order to make the three SCCOOS moorings (SIO, UCSB, UCLA) more equivalent with time.

Lease vs. purchase for the Seacat: The Seacat is a mooring sensor which will be used for many consecutive year-long deployments, certainly for the length of this project. The anticipation is that they will be useable and used for more than 5 years, and thus a purchase is the most economical way.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Terrill/Orcutt
Period of Performance: October 1, 2007 – September 30, 2008

Overview:

We propose to continue our effort to integrate data collected in SCCOOS for broad use. Generally, all data collected by SCCOOS will be freely available and will be accessible in as close to real-time as possible. Currently, the following data from across the Southern California bight are available at www.sccoos.org: automated shore stations; manual shore stations; bathymetric; moorings; met stations; satellites; shoreline water quality; HF Radar surface current maps; surface winds and rainfall; wave conditions (CDIP); and cast data from ships and gliders. These data will continue to be available and will be augmented with both raw data and data products. SCCOOS will continue to integrate the data collection efforts to be IOOS Data Management and Communications (DMAC) compliant (DMAC, 2003).

Data Management FY 07 Specific Plans:

We will use the bulk of these funds to support data managers, who currently and will continue to:

- Develop, implement, maintain, and conduct web operations for www.sccoos.org.
- Implement and operate archiving scripts.
- Optimize the SCCOOS data system. As data volumes increase, data optimization is required to minimize database query latency. In addition, storage capacity of the existing SCCOOS data system hardware will soon be exceeded, requiring investments in both new hardware and data access programs.
- Work with NOAA Coastal Services Center (CSC) to establish and use accepted data management standards where possible (and appropriate) to allow interoperability with other funded regional and federal IOOS implementers.

- Serve as the data management contact for end users and data providers. SCCOOS regularly exhibits at conferences and workshops related to coastal observing, developing contacts with end user/data providers at these events. SCCOOS consortium members, especially those with established user communities, are another source for locating end users and data providers willing to work with SCCOOS. We are prioritizing development of data products through the SCCOOS Executive Steering Committee.
- Work with end user/data provider data management personnel to determine how to integrate their data into the SCCOOS data management system, and best methods for online access and presentation of their data.
- Work with the rest of the SCCOOS operations team, including oceanographers, web developers, designers and of course end-users, to develop products that are effective, web-based, and user-friendly.
- Implement and maintain data transport to the JPL data assimilating ocean model.

- Interface with programmers already conducting data management in Southern California to:

    - standardize the process of choosing appropriate metadata and data schemas,
    - import and insert data into databases,
    - query these databases for information,
    - return data from these databases (both directly to users and to other programs),
    - display data to users in a graphical form,
    - provide a display of the current status of stations (whether they are operational, whether they are currently receiving data, whether they are responding to other machines, and any other related information such as expected downtime or notes from field technicians).

Sample projects (in progress):

NEOCO Data Source: the Network for Environmental Observations of the Coastal Ocean (NEOCO) project monitored ocean conditions along the California coast. Data from the NEOCO project are currently being streamed to SIO and exported to a MySQL database on another machine. We have assimilated these data into the SCCOOS data stores, receive real-time updates from these shore-based stations at several locations along the California coast, and offer both plots and RSS feeds to the general public to allow constant monitoring of these sources. This work has partially been motivated by the need to resuscitate the NEOCO program, which, due to lack of funds, had to shut down its ORACLE based data server. Investment into the SCCOOS data server will allow continued use of a wide class of SCCOOS shorestations, extending beyond the four original NEOCO sites.

Transmission of Ocean Mooring Data to NDBC: SCCOOS funded programmers are aggregating the data from the three multidisciplinary moorings deployed under SCCOOS funds, and have begun transmitting those data to the National Data Buoy Center (NDBC). The first mooring to transmit data to NDBC has been the San Diego mooring, with efforts to be placed on the Santa Monica Bay and Santa Barbara moorings as those data become accessible in realtime.

The Los Angeles County Coastal Monitoring Network (LACCMN) monitors beach conditions in Los Angeles County. Ultimately, we would like these data to be integrated into a graphical data display with the NEOCO project and the non-real-time SIO Shore stations project. We are designing and implementing a means of importing data from the LACCMN project into a Datascope database, and plan to integrate data from the LACCMN project into an interactive map of Southern California shore station.

SIO Shore Stations: Members of the SIO Short Station Project have been manually gathering temperature, salinity, and density information from water samples in La Jolla, San Clemente Island, Santa Catalina Island, Newport Beach, Santa Monica, and many other locations over the past century. These data are still being collected daily but analyzed monthly, and hence are added in batches in a non-real-time fashion. We have integrated this data into the SCCOOS data system and now serve as a primary repository for this shore station data, which is available both for display as an historic timeline, and for download.

SIO Pier Chlorophyll Data: the SCCOOS project will be integrating water quality and species composition data collected on the SIO Pier to the SCCOOS data stores for dissemination and display to the public. This data set will represent the first species data to be incorporated into the project. The data will be incorporated by data managers into the system weekly or when available.

Regional Coastal Meteorological Observations*:* The NAVAIR meteorological detachment at Pt Mugu, California is already working with SCCOOS IT staff for the sampling and telemetry of newly installed meteorological stations in Southern California. Their group has already developed a capability to routinely query all MET stations in Southern California, and create a gridded wind field. The NAVAIR staff has indicated a desire to work with SCCOOS IT staff to a) take over responsibility of the data queries to the individual sites, b) archive these data, and c) provide data access to these observations. SCCOOS programmers also work with the MADIS database of coastal met stations.

Bight-wide Shoreline Water Quality Data*:* At present, no centralized database exists for rapid and easy public access to shoreline water quality data that are used for beach postings and closures. Efforts have begun to aggregate and store data from San Diego and Orange County agencies. Working with local and state water officials, we plan to build upon these efforts so that the results can eventually be linked with planned Coastal Ocean Currents Monitoring Program (COCMP) and other observational efforts.

Coastal Data Information Program (CDIP) Wave and Temperature Data: SCCOOS currently receives regular temperature and wave data from the CDIP program, and has plans to provide additional graphical displays for the general public differing from CDIP's current offerings.

National Pollutant Discharge Elimination System (NPDES) Permit Holder CTD data from POTWs: In an effort to increase the depth of our water quality data offerings, we are in the process of incorporating cast data from the major Publicly Operated Treatment Works (POTW) operators in Southern California. This has included interagency organizing efforts that now

allows the movement of those data to SCCOOS on a quarterly basis. These data are now available on the www.sccoos.org website.

COAMPS wind forecasts: SCCOOS works with the Navy Fleet Numerical Meteorology and Oceanography Center (FNMOC) to access and distribute 48 hour wind and rain forecasts. The forecasts are available at high resolution (1.6km) for the entire bight, with hourly forecasts made to 48 hours. Forecasts are updated every 12 hours.

CalCOFI Cast Data: The SCCOOS project has continued to discuss data sharing practices with the CalCOFI project members and ensuring member needs will be met by the system, and has laid the groundwork for data integration planned for the future. These data will be integrated with other cast data including glider and CTD data from the NPDES permit holders.

SCCOOS Web Site: The web site is currently hosted on a Red Hat Linux machine at Scripps Institution of Oceanography. The site comprises both static and dynamic content to balance availability with timeliness, and offers the public an interactive map displaying the full extent of SCCOOS participation and responsibility; interactive displays making extensive use of current technologies, including Java, AJAX, and Google Maps; and a user-friendly query engine to access all current SCCOOS data as it is made available. Further efforts are being made to more tightly integrate data from divergent sources, and to offer an extensive interactive data inventory to serve user needs.

In addition, a community participation and data management site powered by the Zope application server and utilizing the Plone content management system has been maintained at http://www.sccoos.org/interactive to offer documentation, best practices, meeting notes, and simple communication between SCCOOS participants.

Guiding Principles for the SCCOOS data management operations:

Our guiding principals are taken from the DMAC plan, which proposes:

- Interoperability
- Open easy access and discovery
- Reliable, sustained, efficient operations
- Effective user feedback
- Open design and standards process
- Preservation of data and products
-

The plan also cites several significant challenges:

- Loosely federated organizations
- Physically distributed repositories
- Heterogeneous data

We continue to build upon work at the San Diego Supercomputer Center (SDSC) and SIO in the development of the Storage Resource Broker (SRB) and the NSF-sponsored Information Technology Research Real time Observatories and Data management Network (ROADNet)

project. The SRB is middleware that provides distributed clients with uniform access to diverse storage resources in a heterogeneous computing environment. Figure 2 illustrates the operation of the SRB schematically.

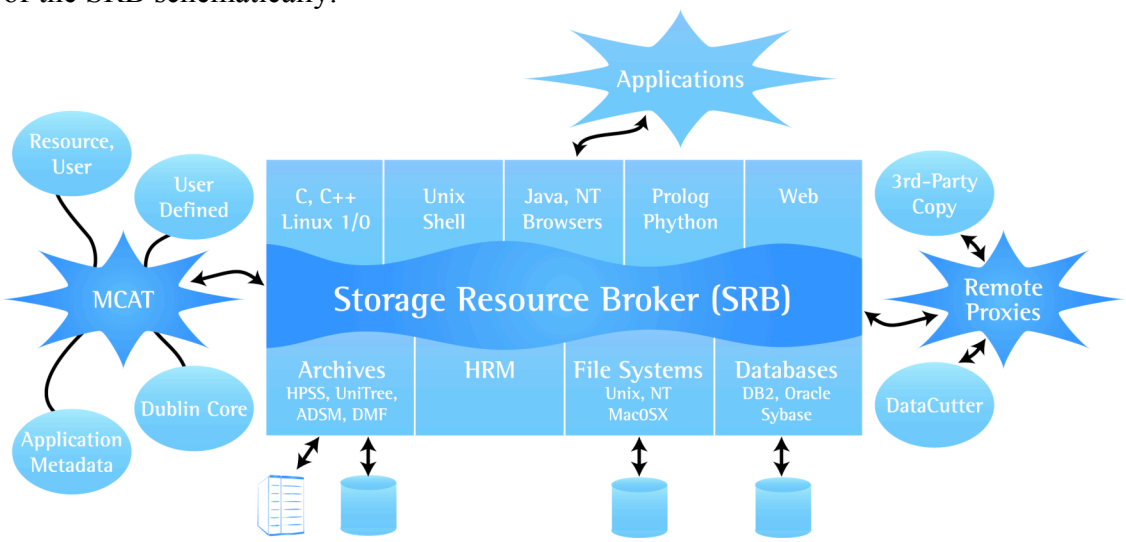

Figure 2: schematic diagram of the Storage Research Broker (SRB)

While the IOOS data standards are evolving, SCCOOS is faced with the challenge of providing data management activities for the now. Its managers have participated where possible in national discussions (QARTOD, Marine MetData workshops, IOOS Interoperability workshops, etc). At present, our system is built on a 'system of systems' approaches, using databases that are optimized for a select set of variables. Technologies used include the SRB, Antelope/Datascope, SQL, MySQL, Oracle, php, c/c++, java/java script, perl script, JP Graph, Google Earth and Google Maps.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: TERRILL/ORCUTT
DATA MANAGEMENT
OCTOBER 1, 2007 through SEPTEMER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
E. Terrill CORDC Director	7/07	16,670	0.25	100.00%	0.25	4,168	4,168
J. Orcutt Professor	7/07	0	0.00		0.00	-	No Salary Requested
L. Hazard Programmer/Analyst	7/07	10,373	0.25	100%	0.25	- 2,593	2,593
M. Otero Programmer/Analyst	7/07	8,156	2.00	100%	2.00	- 16,312	16,312
P. Reuter Programmer/Analyst	7/07	8,253	1.00	100%	1.00	- 8,253	8,253
				Total person months	3.50		
						SALARIES AND BENEFITS TOTAL	**31,326**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **6,892**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	500
Project Specific Laboratory Supplies	1,500
Project Specific Computer Hardware Maintenance and Supplies	2,264
Project Specific Computer Software & OS Maintenance & Consortium Costs	1,848
Project Specific Web Hosting Service	6,000
Software license renewal (OCM, Fleudermaus, Google Earth Full, Matlab, OS XP)	7,500
Terascan license renewal	3,525
SUPPLIES & OTHER EXPENSES TOTAL	**23,137**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
RT SD/Washington, DC	$ 810			3	$ 2,430
Car rental/Ground Transportation		$ 50	2	3	$ 300
Per Diem		$ 269	2	3	$ 1,614
				TRAVEL TOTAL	**4,344**

TOTAL DIRECT COSTS **65,699**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

Tuition:	*0*	Base	OH Rate	
Equipment:	*0*	65,699	16.0%	10,512
Excluded from Indirect	*0*			

TOTAL INDIRECT COST **10,512**

TOTAL AMOUNT REQUESTED **76,211**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Terrill/Orcutt
Period of Performance: October 1, 2007 – September 30, 2008

Data Management

Salaries
Eric Terrill (0.25 mos.) will serve as lead PI on this project, overseeing data management activities related to SCCOOS website hosting, data distribution, data archiving, data display and online product development. John Orcutt will assist Terrill in national planning activities at no cost to this project. Funds are also requested for programmer analyst salaries: Lisa Hazard (0.25 mos.), Mark Otero (2 mos.), and Paul Reuter (1 mo.). The programmers will continue supporting data requests, database optimization for improving response time of queries and web display rates, coordinating with SCCOOS consortium members for new data sources, and assessing end user needs for product development as outlined in the Statement of Work.

Scripps Institution of Oceanography partially supports the salaries of Professors, Associate Professors, Assistant Professors, Researchers and Associate Researchers, but makes no specific commitment of time or salary to this particular research project.

Project Specific Supplies
Project specific supplies include funds for 12 months of computer web hosting services; hardware and software maintenance; and software license renewals for programs supported within the project. Costs have been included which are project specific costs related to communications, such as telephone, voice and data communication; photocopying, and printing costs. Requested funding for maintenance and consortium costs related to the use of laboratory computers are included. Costs categorized as project specific are for expenses that specifically benefit this project and are reasonable and necessary for performance of this project. The following specific software licenses are budgeted to conduct data management activities for SCCOOS: Terascan, OCM, Fleudermaus, Google Earth Full, MATLAB, and OS XP.

Travel
Travel funds are requested for participation in data management meetings and/or conferences related to coastal observing for developing contacts with end users/data providers. Travel budget consists of travel and expenses for three trips to Washington, D.C. (NOAA or Ocean.US meeting) related to regional and federal IOOS planning efforts, and data management interoperability meetings such as Marine Metadata.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

Long Range CODAR Installation and Evaluation

Two long range, 4-5MHz HF radar system designed to measure ocean surface currents at resolutions of 6-10km out to ranges of 150-180km are being deployed, operated, and evaluated as part of the SCCOOS pilot observatory program. The system will be composed of two CODAR Seasonde systems which are based on compact antenna design and rely on direction finding algorithms for determining the bearing angle of the ocean currents. The first system will be deployed at Point Loma, San Diego at the US Coast Guard (USCG) Point Loma Lighthouse. Scripps has installed the hardware at San Clemente Island, but beam patterns, calibrations, and system qa/qc needs to be conducted. The second radar is temporarily installed in La Jolla at the NOAA Southwest Fisheries Center. This radar is to be relocated to the USCG Point Loma Lighthouse property. Prior to installation, the radar electronics need to be tested, and solutions developed, to remove any interference with operational Coast Guard electronics. Scripps will work with the various organizations at USCG (real property office, electronics, aids to navigation) to obtain final siting permission. The Point Loma site is ideal as it provides a good field of view south into Mexico. Additional activities for 2007 include:

- Complete installation of both long range HF radar systems, including the installation of robust telemetry.
- Qa/qc long range HF radar data, including the generation of coverage maps and tidal analysis.
- Work with colleagues in Mexico to bring an existing radar system they own, and presently offline, back online. Integrate data from this system into the SCCOOS data system.
- Initiate the development of realtime products for HF radar that would be integrated into the processing of realtime vector (RTV) processing. Products to include:
    - Vorticity/Divergence
    - Spatial gap filling
    - Particle tracking (in conjunction with work of Cornuelle)
    - Evaluation of short term forecasting tools.

These two systems are being leveraged against the CA state sponsored Coastal Ocean Currents Monitoring Program. Real-time data products from the system will be used for a number of different efforts: 1) Search and Rescue: This region experiences a number of search and rescue efforts due to Navy Operations, commercial and recreational fishing and boating, and cruiseliners 2) Oil Spill: Lightering of very large VLCC tankers takes place inshore of San Clemente Island 3) Testing of data assimilation and circulation models in this domain.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: TERRILL
LONG RANGE CODAR
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
E. Terrill CORDC Director	7/07	16,670	0.00	0.00%	0.00	-	No Salary Requested
L. Hazard Programmer/Analyst	7/07	10,373	1.00	100%	1.00	10,373	10,373
T. Cook Programmer/Analyst	7/07	8,945	2.00	100%	2.00	17,890	17,890
M. Otero Programmer/Analyst	7/07	8,156	1.00	100%	1.00	8,156	8,156
A. DePaolo Staff Research Assistant	7/07	4,402	1.00	100%	1.00	4,402	4,402
				Total person months	5.00		
						SALARIES AND BENEFITS TOTAL	**40,821**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **8,981**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	800
Project Specific Laboratory Supplies	3,646
Project Specific Computer Software & OS Maintenance & Consortium Costs	2,310
Electronic Supplies, Components and Repairs	1,800
Experimental and Field Expendables and Supplies	4,040
Wireless Networking Hardware for Data Communications	2,595
SUPPLIES & OTHER EXPENSES TOTAL	**15,191**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
RT SD/San Clemente Island	$ 179			12	$ 2,148
Car rental/Ground Transportation		$ 52	2	3	$ 312
Per Diem		$ 75	2	12	$ 1,800
				TRAVEL TOTAL	**4,260**

TOTAL DIRECT COSTS	**69,253**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

Tuition:	*0*	Base	OH Rate	
Equipment:	*0*	69,253	16.0%	11,080
Excluded from Indirect	*0*			
TOTAL INDIRECT COST				**11,080**
TOTAL AMOUNT REQUESTED				**80,333**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

Long Range CODAR Installation and Evaluation

Salaries
This budget component represents costs associated with the implementation of the long range HF radar component for SCCOOS - Shelf to Shoreline Observatory Development. One month for Programmer Analyst Lisa Hazard is budgeted to oversee the integration, installation, and data qa/qc. Funds are also requested for Programmer Analysts Tom Cook (2 mos.) and Mark Otero (1 mo.) to perform site maintenance, system testing, evaluate the HF radar system operations, and to support real-time data delivery and algorithm applications for trajectory products. One month of salary for Staff Research Associate Anthony DePaolo is requested to analyze and assess beam patterns for the two long range radar systems to ensure optimal inputs to the direction finding algorithms..

Project Specific Supplies
Funds are budgeted for field and laboratory supplies including tools, mechanical and electrical parts necessary to complete the installation; computer software for design components and data analysis; funds for any permitting fees; and wireless networking equipment for realtime data telemetry. Costs have been included which are project specific costs related to communications, and computer maintenance and consortium costs related to the use of laboratory computers. Supply and expense items categorized as project specific are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Travel
Funds are requested for three trips (four persons each) to San Clemente Island for conducting beam patterns, conducting repairs as needed to power support systems (circuit breakers, UPS), and follow-up maintenance of the installed hardware.

UCSD 2007-1103

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

Nearshore Sampling Program – Automated Shore Stations

This project consists of a) Continuing the maintenance of the several shore stations consisting of underwater sensors deployed on piers in Southern California. The initial deployment of these stations were supported under separately funded programs including the UC Marine Council Network for Environmental Observations of the Coastal Ocean (NEOCO) project and the CA Clean Beaches Initiative. These sites have sensors for the measurement of pressure, temperature, and conductivity. A few select sites also have chlorophyll flourometers and turbidity sensors. Site locations that will be supported by SCCOOS include Santa Barbara, Santa Monica Bay, Newport Beach, La Jolla, and Imperial Beach. The sensor packages are deployed from piers. The sensor packages relay their data to a central data server on a regular basis using various telemetry techniques. Sensors are also swapped out on a regular basis for recalibration or when qa/qc flags indicated fouling. b) QA/QC of the data flow to ensure values measured by the sensors are sensible. Poor data is flagged and recommended for field maintenance. c) Maintenance of the data network responsible for aggregation, storage, and archival of the automated sensor data. The maintenance of the database in which data is archived. d) Continuing integration of the automated shore station database with the historical shore station program which consists of manually obtained daily temperature and salinity measurements from 18 sites on the west coast of the United States. This historical database, with some sites dating back to 1916, is in wide use as an indicator of climate state by marine managers. e) Continuing integration of the SCCOOS automated shore stations with other shore station networks in Southern California including the County of Los Angeles sponsored Watch the Water (www.watchthewater.org) program. SCCOOS scientists have worked with this organization in providing both sensor specification and IT support. Linking the SCCOOS shore station data flow with their pier-based temperature sensors will provide another 7 additional shore stations at which nearshore water temperatures are measured. f) Continuing development of methods for online data retrieval and creation of data graphs from the various sites whose data will be collected by the SCCOOS shore station data system.

While the existing SCCOOS automated shore station program consists of sensors which only measure a few parameters that are deemed sustainable with present technology, the program is also closely aligned with a manual shore station program designed to sample for chlorophyll, nutrients, algae species responsible for harmful algal blooms, and the potential presence of toxins from these species. See statement of work from Venrick and McGowan.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: TERRILL
NEARSHORE SAMPLING
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
E. Terrill CORDC Director	7/07	16,670			0.00	-	No Salary Requested
W. Middleton Jr. Development Engineer	7/07	5,588	2.75	100%	2.75	- 15,367	15,367
L. Hazard Programmer/Analyst	7/07	10,373	0.50	100%	0.50	- 5,187	5,187
				Total person months	3.25		
						SALARIES AND BENEFITS TOTAL	**20,554**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **4,522**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	500
Project Specific Laboratory Supplies	2,000
Project Specific Computer Software & OS Maintenance & Consortium Costs	1,386
Wireless Networking service for 3 Shore Stations	1,920
Calibration Service	3,960
Laptop field computer for instrument troubleshooting	3,532
Experimental and Field Expendables and Supplies	2,450
SUPPLIES & OTHER EXPENSES TOTAL	**15,748**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
RT SD/Santa Barbara					
(2 people x 2 trips)					
UCSD Vehicle Charge		$ 78	2	2	$ 312
Per Diem		$ 237	2	4	$ 1,896
RT SD/UC Irvine					
(2 people x 2 trips)					
UCSD Vehicle Charge		$ 78	2	2	$ 312
Per Diem (Orange County)		$ 181	2	4	$ 1,448
RT SD/UCLA					
(2 people x 2 trips)					
UCSD Vehicle Charge		$ 78	2	2	$ 312
Per Diem (Los Angeles)		$ 181	2	4	$ 1,448
				TRAVEL TOTAL	**5,728**

TOTAL DIRECT COSTS **46,552**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

Tuition:	*0*	Base	OH Rate	
Equipment:	*0*	46,552	16.0%	7,448
Excluded from Indirect	*0*			

TOTAL INDIRECT COST **7,448**

TOTAL AMOUNT REQUESTED **54,000**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

Nearshore Sampling Program – Automated Shore Stations

Salaries
This budget component represents costs associated with supporting the operations, maintenance, and calibration of a network of automated shore station, and will be managed by SCCOOS PI and CORDC Director Eric Terrill. Salaries for William Middleton (2.75 mos.) and Lisa Hazard (0.5 mo.), the two principal staff members who will maintain the automated shore stations in Santa Barbara, Santa Monica Bay, Newport Beach, and two sites in San Diego, are budgeted to conduct the work.

Project Specific Supplies
Funds are requested for the maintenance of automated shore stations. This includes networking costs specific to the work on this project ($1,920), field expendables and supplies for maintaining the stations ($2,450), laboratory supplies ($2,000) for calibrations and field prepping sensors, and recalibration of the Conductivity, Temperature, and Depth (CTD) meter ($3,960). Costs are included for a laptop field computer ($3,532) for instrument trouble shooting. Funds are also requested for project specific costs related to communications ($500) and computer software, maintenance, and consortium costs ($1,386) related to the use of laboratory computers. Supply and expense items categorized as project specific are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Travel
Travel funds are requested for two trips each to Santa Barbara, Orange County, and Los Angeles for necessary field equipment and station maintenance. Costs include a UCSD vehicle in lieu of mileage. Per diem rates are a composite of the meal and hotel allowance of the US State Department's published rates.

UCSD/SIO
Statement of Work
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

SPECIAL SITES / RAPID RESPONSE PROGRAM

An issue that has increasingly presented itself to SCCOOS operations is the need to provide rapid response to unplanned events. Examples include intermittent pollutant discharges, storm response, red tides blooms, and multi-agency sampling events/planning programs such as the Bight 08 water quality survey that are not yet defined and difficult to plan for with the present long lead time NOAA Budget cycle (~ 12 months in advance). While SCCOOS has the technical and data management base to support these programs, requests are often difficult to meet due to lack of allocated resources for those efforts. In an effort for SCCOOS to be more responsive to its regional stakeholders, SCCOOS is allocating FY2007 resources to provide a rapid response capability that would allow an intensive observing campaign and data interpretation effort to take place. We expect this type of proactive planning, and execution of specialized projects will pave the way for the development of new and innovative products. Example activities that we anticipate conducting with these resources include:

- Specialized data management support for an event of public interest or at localized geographic special sites. Supported activities may include the generation of new data products, data ingestion activities, analysis of SCCOOS data fields for a specific application, or rapid turnaround of SCCOOS observations to decision makers.
- Coordinated deployment of observational tools for an intensive time period. Stakeholder interests at focused times or places may require additional ocean observations to provide necessary environmental data to aid decision makers. While intensive data gathering activities are cost prohibitive at all places and times, requests are often made which co-align themselves with the goals of SCCOOS. To be responsive to the SCCOOS stakeholders, resources will be used to make observations for short time periods at specific locations. Examples may include the deployment of AUVs, gliders, drifters, moorings, and other specialized sensors on an event basis.
- Coordinating data gathering activities without stakeholder interest groups. Many of the mission-driven agencies in the region present opportunity for regional coordination, and augmentation of existing sampling efforts with specialized sensors or protocols. An example is the regional Bight surveys conducted by the NPDES permit holders in the region. Allocating resources towards planning and implementation of observing system components that meet the needs of this audience will allow us to remain responsive to our user base.
- Deployment, turnaround, and maintenance of deployed instruments using research vessels.

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: TERRILL
SPECIAL SITES
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
E. Terrill CORDC Director	7/07	16,670				-	No Salary Requested
L. Hazard Programmer/Analyst	7/07	10,373	2.50	100%	2.50	- 25,932	25,932
T. Cook Programmer/Analyst	7/07	8,945	1.50	100%	1.50	- 13,418	13,418
M. Otero Programmer/Analyst	7/07	8,156	1.50	100%	1.50	- 12,234	12,234
TBN Asst. Development Engineer	7/07	8,375	6.00	100%	6.00	- 50,250	50,250
TBN Asst. Development Engineer	7/07	8,375	6.00	100%	6.00	- 50,250	50,250
				Total person months	17.50		
						SALARIES AND BENEFITS TOTAL	**152,084**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **33,458**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges					2,600	
Project Specific Laboratory Supplies					2,100	
Project Specific Computer Software & OS Maintenance & Consortium Costs					5,544	
Experimental and Field Expendables and Supplies					4,137	
Ships/Research Platforms						
R/V New Horizon	7	days @	$ 14,690	/day	102,830	
R/V Robert G. Sproul	14	days @	$ 9,827	/day	137,578	
Technical Services Support:						
R/V New Horizon	7	days @	$ 1,569	/day	10,983	
R/V Sproul	14	days @	$ 1,283	/day	17,962	
					SUPPLIES & OTHER EXPENSES TOTAL	**283,734**

TRAVEL *Domestic*	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*	
RT SD/Santa Barbara, CA						
UCSD Vehicle Charge		$ 78	5	4	$ 1,560	
Per Diem		$ 237	5	4	$ 4,740	
					TRAVEL TOTAL	**6,300**

				TOTAL DIRECT COSTS	**475,576**
INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)					
Tuition:	*0*	Base	OH Rate		
Equipment:	*0*	475,576	16.0%	76,092	
Excluded from Indirect	*0*				
IDC on Subcontract(s):					
Ocean Institute IDC		43,696	16.0%	6,991	
				TOTAL INDIRECT COST	**83,083**
				TOTAL AMOUNT REQUESTED	**558,659**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Terrill
Period of Performance: October 1, 2007 – September 30, 2008

Special Sites

Salaries
SCCOOS PI and CORDC Director Eric Terrill will manage this program.
The majority of this budget is allocated towards salaries to allow SCCOOS to be responsive to special sites and rapid response activities. Funds are requested for 2.5 months Lisa Hazard to coordinate response activities and participate in planning meetings. Additional funds are requested for an equivalent level of technical staff (2 TBN Assistant Development Engineers) 6 months/year to provide for this capability. Rapid response efforts require large number of persons for short periods of time. This resource allocation will meet these needs. Tom Cook and Mark Otero (1.5 mos. each) are supported to prepare instruments and perform specialized data management activities for these events.

Project Specific Supplies
Laboratory supplies are budgeted to allow preparation and maintenance of instruments. Field supplies are budgeted for expendable items (batteries, anti-fouling paint, marine hardware) for the field activities related to this program. Costs have been included which are project specific costs related to communications, and computer maintenance and consortium costs related to the use of laboratory computers. Supply and expense items categorized as project specific are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Ship time
Two weeks of the R/V Sproul and technicians are budgeted to support Bight wide mooring operations and specialized platform deployments in response of special programs. One week of the R/V New Horizon and technicians are requested to augment the CALCOFI trips for in-shore biological sampling.

Travel
Funds are requested for four, 5-day trips within Southern California for site maintenance and management. Costs include a UCSD vehicle in lieu of mileage. Per diem rates are a composite of the meal and hotel allowance of the US State Department's published rates.

IDC
The Indirect Costs for the Ocean Institute are included in this budget. Because the Institute is a subcontract for services, IDC is assessed to their budget and is reflected in this project. Ocean Institute is supported to develop educational outreach materials based upon observing system activities conducted by SCCOOS. Please refer to their statement of work for more details.

UCSD/SIO
Statement of Work
NOAA Proposal
PIs: Venrick/ McGowan
Period of Performance: October 1, 2007 – September 30, 2008

In California, increasing attention has been paid to the marine diatom *Pseudo-nitzschia*, known to produce domoic acid (DA), which is toxic to marine mammals and seabirds as well as humans. Toxic *Pseudo-nitzschia* species are responsible for amnesic shellfish poisoning. In California, DA was first recognized in Monterey Bay, after a dramatic seabird kill in September 1991. Since then, the toxin has been implicated in other deaths of marine mammals and seabirds between Monterey Bay and San Diego. In 2004, we provided the first confirmation of the presence of domoic acid in phytoplankton and fish in San Diego (Busse et al., 2006). In February, 2004, we detected domoic acid in seawater samples collected off the Scripps Pier and also in coastal samples as far as 120 km to the north. At the same time, we observed populations of toxic *Pseudo-nitzschia australis* and *Pseudo-nitzschia multiseries* as high as 7.7 $x10^4$ cells l^{-1}. Domoic acid concentrations in the viscera from 4 species of fish obtained at or near the Scripps Pier ranged from low to above the critical level for public safety. Samples of mussel tissues from the Scripps Pier contained low but detectable amounts of domoic acid. Domoic acid in tissue from mussels and fish provides evidence for the local transfer of domoic acid from an algal source to higher trophic levels in San Diego coastal waters. Given our findings, a regular monitoring of domoic acid in phytoplankton is recommended for San Diego County.

Twice weekly surface samples of sea water taken from the end of Scripps Pier will be analyzed for chlorophyll, four plant nutrients, temperature, and salinity. A net tow will also be conducted during sampling in order to determine the presence or absence of potentially harmful algal species including but not limited to *Pseudo-nitzschia* spp., *Lingulodinium polyedrum*, *Gymnodinium* spp., *Prorocentrum* spp., *Dinophysis* spp., and *Alexandrium catanella*. On a weekly basis water samples will be enumerated in order to determine the abundance of these potentially toxic species in comparison with other non-toxic phytoplankton species. We will also preserve all water and net tow samples to archive for species identification.

Over the past 4 years, increased abundances of *Pseudo-nitzschia* spp have been observed at Scripps Pier sometime between mid-December and mid-March. During these months, or if *Pseudo-nitzschia* spp. are observed at levels that may begin to pose human health risks, abundance measurements using molecular probes will be conducted on a weekly basis to determine the number and species of domoic-acid producing diatoms (*Pseudo-nitzschia australis* and *Pseudo-nitzschia multiseries*) that are present in water samples. When toxic *Pseudo-nitzschia* species are found, we will measure domoic acid concentrations using High Performance Liquid Chromatography (HPLC).

UCSD # 2007-1103

JOINT INSTITUTE FOR MARINE OBSERVATIONS
SCRIPPS INSTITUTION OF OCEANOGRAPHY
PI: VENRICK/MCGOWAN
OCTOBER 1, 2007 through SEPTEMBER 30, 2008

SALARIES & BENEFITS	FY	Monthly Recharge Rate	No. Mos. Effective	% Salary or Effort	Total Person Mos	Subtotal	TOTAL
E. Venrick Research Oceanographer	7/07	0			0.00		No Salary Requested
J. McGowan Research Professor	7/07	0			0.00		No Salary Requested
M. Carter Staff Research Associate II	7/07	5,154	12.00	41.25%	4.95	25,512	25,512
				Total person months	4.95		

SALARIES AND BENEFITS TOTAL **25,512**

LABORATORY SUPPORT SERVICES **22% of Total Labor less Overtime **5,613**

PROJECT SPECIFIC SUPPLIES, MATERIALS, & OTHER EXPENSES:

Project Specific Communications, Mailing/FedEx, Network Costs, Faxing, Copying, & Telephone Toll Charges	850
Project Specific Laboratory Supplies	455
Project Specific Computer Maintenance	495
Sampling Gear	120
GF Filters	400
Chemicals (Acetone)	250
Nutrient Analyses	1,650
Fluorometer maintenance	100
Toxin Analysis (During Bloom Events)	900
Whole Cell Probing (During Bloom Events)	900
Domoic Acid Measurements (During Bloom Events)	1,000

SUPPLIES & OTHER EXPENSES TOTAL **7,120**

TRAVEL

Domestic	*Airfare*	*Car/RF Per Diem*	*No. of Days*	*No. of Trips*	*Total*
RT SD/San Jose	$ 275			2	$ 550
Car rental/Ground Transportation		$ 54	2	2	$ 216
Per Diem (Santa Cruz)		$ 161	2	2	$ 644

TRAVEL TOTAL **1,410**

TOTAL DIRECT COSTS **39,655**

INDIRECT COSTS (less equipment, tuition remission, subcontract cost in excess of $25K)

		Base	OH Rate	
Tuition:	*0*			
Equipment:	*0*	39,655	16.0%	6,345
Excluded from Indirect	*0*			

TOTAL INDIRECT COST **6,345**

TOTAL AMOUNT REQUESTED **46,000**

UCSD/SIO
Budget Justification
NOAA Proposal
PI: Venrick/McGowan
Period of Performance: October 1, 2007 – September 30, 2008

Salaries
Drs. Elizabeth Venrick and John McGowan are the Co-Investigators responsible for this component. Funds are requested for Melissa Carter (4.95 mo.) to collect and analyze samples.

Scripps Institution of Oceanography partially supports the salaries of Professors, Associate Professors, Assistant Professors, Researchers and Associate Researchers, but makes no specific commitment of time or salary to this particular research project.

Salary recharge rates are calculated for actual productive time only (except for non-faculty academic sick leave, which is charged as direct). The rates include components for employee benefits, provisions for applicable merit increases and range adjustments in accordance with University policy. As required to meet project objectives, separate rates for remote location allowance or premium overtime costs will be used.

Project Specific Costs
Funds are requested for field supplies, laboratory supplies, and laboratory analyses. Field supplies include sampling gear, thermometers, phytoplankton nets, and sampling bottles. Laboratory supplies include chemicals necessary for chlorophyll extraction, whole cell probing, and domoic acid analysis; general laboratory supplies including forceps, items for filtration rig (pvc pipe, tubes, and pump), filter papers, sample storage bottles, eye protective gear, pipettes, and pipet calibration. Laboratory analyses for nutrient concentrations are analyzed by the Ocean Data Facility at Scripps Institution of Oceanography (current rate $16.67 per sample) and domoic acid measurements are conducted at the University of Santa Cruz with Dr. Mary Silver's lab. These analyses are conducted outside of this lab group due to the high cost of equipment and personnel time to keep these instruments in operation. Fluorometer maintenance expenses include the cost for routine calibration, chlorophyll standards, light bulbs, and batteries.

Project specific supplies, materials, and other expenses include telephone equipment, tolls, voice and data communication charges, photocopying, faxing, and postage. Supply and expense items, categorized as project specific, and computer and networking services are for expenses that specifically benefit this project and are reasonable and necessary for the performance of this project.

Travel
Funds are requested for two round trips from San Diego to Santa Cruz, CA for domoic acid measurements.

Multi-Campus Awards
Subawards
Subcontracts

1UNIVERSITY OF CALIFORNIA, LOS ANGELES UCLA

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

OFFICE OF CONTRACT AND GRANT ADMINISTRATION
10920 WILSHIRE BOULEVARD, SUITE 1200
LOS ANGELES, CALIFORNIA 90024-1406

PHONE: (310) 794-0102
FAX: (310) 794-0631

www.research.ucla.edu/ocga

November 21, 2206

Marine Physical Laboratory

Scripps Institute of Oceanography

University of California, San Diego

291 Rosecrans Street, Building 106

San Diego, CA 92106

ATTENTION: Ms. Debi Pollard

Subject: Continuation Proposal for the project entitled,

"SCCOOS: Shelf to Shoreline Observatory Development"

UCLA Principal Investigator: Professor Keith Stolzenbach

Dear Ms. Pollard:

Enclosed is a copy of our proposal for the above referenced project under your award # NA17RJ1231. Our proposal has been signed on behalf of the Regents of the University of California, Los Angeles campus.

If any further information is needed, please contact Ms. Martha Hansen, Sr. Contract and Grant Officer at (310) 794-2644 or at mhansen@resadmin.ucla.edu.

Thank you for your consideration of our proposal.

Sincerely,

Virginia Anders

Assistant Manager

Enclosures as stated

University of California, Los Angeles
Statement of Work
NOAA Proposal
PI: Stolzenbach
Performance Period: July 1, 2007 – June 30, 2008

SCCOOS "Shelf to Shoreline Observatory Development"

The following describes the tasks to be performed by the Coastal Center of the University of California, Los Angeles (UCLA) Institute of the Environment (IoE) as a component of the Southern California Coastal Ocean Observing System (SCCOOS) proposal entitled "Shelf to Shoreline Observatory Development." This proposal is being submitted to the National Oceanic and Atmospheric Administration (NOAA) by UC San Diego, Scripps Institution of Oceanography.

Task 1 – Operation and maintenance of the UCLA Santa Monica Bay Mooring

This PROTEUS-type mooring was originally deployed in June 2001 and operated successfully until August 2003 when it was removed for servicing. The second deployment took place from early February 2005 until December 2005. After refurbishment, the mooring was deployed for the third time in early March 2006 and the next recovery is planned for January 2007. The fourth deployment is scheduled for May 2007 with a recovery in the summer of 2008. This interdisciplinary mooring has a complete meteorological station, instruments for surface measurements of temperature, salinity, light transmission, pCO_2, and fluorescence , a string of temperature/salinity sensors extending to 100m depth, and a downward looking ADCP. Data is transmitted in near-real time and posted on an accessible web site. The mooring has already demonstrated its value in documenting the response of the Santa Monica Bay system to seasonal and upwelling scale events and in complementing measurements by boat and satellite systems and simulations of coastal water properties by the ROMS model. All mooring measurements are available at http://www.smbayobservatory.org.

Task 2 – Shipboard measurements of water properties and quality

The UCLA Research Vessel *Sea World* has been operated by UCLA since 1998 for research and educational cruises. The onboard measurement systems available include an underway system with a CT and fluorescence package, a deck-deployed CTD, a towed package with CTD, fluorescence, and light transmission sensors, an RDI hull mounted ADCP, plankton nets, and water samplers. Research use of the vessel has included studies of stormwater discharges, atmospheric deposition of contaminants, zooplankton interaction with fronts, and the dynamics of spiral eddies. For the last three years bi-weekly cruises have facilitated servicing of the Santa Monica Bay Observatory Mooring and established a shipboard based time series for hydrographic, biogeochemical, biological and water quality properties that are not measured autonomously by the mooring.

Task 3 – Circulation, plankton-ecosystem, water-quality, biogeochemical, and sediment transport modeling

The rationale for modeling, assimilation, and analyses is to synthesize disparate measurements and diagnose and forecast unmeasured quantities of interest to SCCOOS users. It requires a continuing evolution of the mathematical modeling capabilities, measurement sampling protocols, data assimilation techniques, and analysis product design as an essential part of the regional coastal observing system. The modeling and data assimilation will be done with U.S. West Coast version of the Regional Oceanic Modeling System that is being developed through the collaborative effort of UCLA, JPL, and SIO. Its operational configuration will encompass the entire Southern California Eight at a nominal resolution of 1 km with higher resolution embedded subdomains in nearshore regions. It will further be embedded in an eddy-resolving North American West Coast domain spanning the California Current System with boundary conditions taken from a coarse-resolution Pacific Basin model. Its surface forcing will be taken from a regional atmospheric model embedded within a global weather model. Each of these model levels will have a real-time data-assimilation component for nowcast and forecast analyses. The global atmospheric and Pacific oceanic assimilation solutions will be derived from national operational centers' products. The Southern California regional measurements and their assimilation in the coastal model will be the responsibility of SCCOOS. UCLA and SIO will be the primary research and development centers for these modeling and assimilation capabilities, and the transition to routine operational analyses will be led by JPL. These analysis products will be distributed via the Internet.

Involvement of end users

The IoE Coastal Center has ongoing relationships with all the major end users in the Santa Monica Bay region, including the Santa Monica Bay Restoration Commission, the Regional Water Quality Control Board, the Sanitation Districts of Los Angeles County, the Sanitation Division of the City of Los Angeles, the Sanitation Districts of Orange County, and the U.S. Corps of Engineers, as well as non-governmental groups such as Heal the Bay and Santa Monica BayKeeper. UCLA will involve these users in this project and will prepare and disseminate information products in a number of ways, including: 1) semi-annual users meetings to allow input on plans for measurements and modeling and to develop specifications for information products; 2) posting of measurement and modeling results on appropriately designed web sites (see http://www.smbayobservatory.org/); and 3) written summary reports to users.

The IoE Coastal Center has several major involvements in K-12 and public education that will be linked to the results of this project. These include the Cruising Classroom aboard the UCLA Research Vessel *Sea World*, the Ocean Globe marine research and outdoor environmental education project, the Center for Ocean Science Education Excellence, and a NSF funded outreach project in association with the Santa Monica Bay Observatory (http://www.smbayobservatory.org - section outreach). School groups and the general public will be involved and will receive information projects in several ways: 1) annual public

information colloquia; 2) exposure during cruises and field trips; and 3) via education-oriented web portals.

University of California, Los Angeles
Shelf to Shoreline Observatory Development
01 July 2007 - 30 June 2008

Salaries:	**Mos.**	**Rate**	**FY 07/08**
J. C. McWilliams, Prof.	0.10	18,478	1,848
K. Stolzenbach, Prof.	0	0	0
X. Capet, Asst Res. II	2.00	5,017	10,034
C. Dong, Asst Res. I	2.00	5,017	10,034
H. Frenzel, Prog/Analyst III	0.50	5,139	2,570
L. Schachter, Lab Asst. II	2.40	3,967	9,521
A. Leinweber, Asst. Res. I	2.00	4,815	9,630
R. Rooke, Program Rep. III	2.80	2,707	7,580
TBN Temp. Tech.	2.50	2,707	6,768
Total Salaries:			**57,985**

Benefits:		
McWilliams@	9.00% of salary	166
Capet @	18.72% of salary	1,878
Dong @	31.77% of salary	3,188
Frenzel @	26.92% of salary	692
Schachter @	27.48% of salary	2,616
Leinvweber @	36.38% of salary	3,503
Rooke @	36.59% of salary	2,774
Temp tech @	36.59% of salary	2,476
Total Benefits:		**17,293**

Total Salaries and Benefits:	**75,278**

Other Direct Costs:	
Expendables associated with mooring turnover	17,000
Shipyard expenses	11,000
Sensor maintenance/replacement	17,473
4 Cruises on R/V SeaWorld	5,000
Project specific costs: Xeroxing, Faxing, Fed Ex, Mailing	693
Communication costs ‡	204
Total Other Direct Costs:	**51,370**

Total Direct Costs:	**126,648**
Modified Direct Costs	**126,648**
Indirect Costs @ 54.5% of MTDC: ¤	**69,024**
Total Amount Requested:	**195,672**

‡ Communication costs based on: Faculty: $45 (long distance)/mo. x (y) mos.
Staff: $55 ($30 hardware/equipment; $25 long distance)/mo. x (y) mos.

¤ MTDC = TDC less equipment.

UCLA
Budget Justification
NOAA Proposal
PI: Stolzenbach
Performance Period: July 1, 2007 – June 30, 2008

Salaries
Funding is requested for 0.1 months of salary support for supervision by the principal investigator Professor James C. McWilliams. Dr. Keith Stolzenbach is providing supervision at no cost to this project. Funding for the modeling component is requested to support one researcher (Capet, 2 months), one programmer (Frenzel. 0.5 month), and one postdoctoral researcher (Dong, 2 months). Additional salary funds are requested to support the continued operation of the mooring: 7.7 months of technician time (Schachter, Rooke, and TBN) for deployment and recovery; and 2 months of a researcher (Leinweber) for instrument maintenance related to the cruises.

Benefits are projected according to the University system-wide schedule.

The University of California partially supports the salaries of Professors, Associate Professors, Assistant Professors, Researchers, and Associate Researchers, but makes no specific commitment of time or salary to this particular research project.

Project Specific Supplies and Other Direct Costs
Funds are requested for project specific communication costs, copying, faxing, and mailing costs, and for expendable supplies.

Funding is also requested to support the continued operation of the mooring. Specific budget items include: supplies associated with the mooring turnover (i.e., cables, rope, swivels, shackles+pears, nilspin, floats, anchor, solar panels, etc.); shipyard expenses (repairing and painting the hull, anchor welding, etc.), maintenance of instruments and sensors (vendor calibration); and purchasing of replacement sensors. The purchase of instruments will be coordinated with the other mooring groups within SCCOOS to build toward a common instrument package deployed by all SCCOOS moorings. No ship time for mooring deployment is requested as this will be covered by independent funds.

Funding is requested to support four cruises on the R/V SeaWorld for the servicing of the mooring (instrument cleaning, replacement, etc). These cruises will also be used for water sampling, permitting us, among other benefits, to calibrate the sensors with independent measurements. We also make use of the synergies that exist with a nearly four year long and ongoing shipboard-based time-series program funded by independent resources. Together with the mooring-based measurements, these time-series cruises will be used to document important oceanographic conditions in the Bay such as plankton blooms, frontal structures, upwelling, stormwater discharges and spatiotemporal variability of the upper ocean carbon and oxygen cycles.

UCSB PROPOSAL NUMBER 20070635

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
c/o University of California, Santa Barbara
Office of Research, 3227 Cheadle Hall
Santa Barbara, California 93106-2050

Federal Employer's ID# 95-6006145W
Congressional District: 23rd
Federal Demonstration Partnership (FDP) Member

I. PROPOSAL SUBMITTED TO: UCSD: SCRIPPS Institution of Oceanography

II. TITLE OF PROPOSAL: SCCOOS: Shelf to Shoreline Observatory Development

Previous Award No. _____

III. PROJECT PERIOD:
7/1/2007 (From) **6/30/2008** (Through)

IV. SUPPORT REQUESTED:
$ **140,000** (Total Project Amount) $ _____ (Total for First Year)

V. PRINCIPAL INVESTIGATOR:

Grace C. Chang
Name

Associate Researcher
Title
Ocean Physics Laboratory
6487 Unit A, Calle Real
University of California, Santa Barbara
Goleta, CA 93117
Mailing Address

805-681-8207 Office Telephone
805-893-3663 Alternate Telephone

VI. CO-PRINCIPAL INVESTIGATOR:

Erika McPhee-Shaw
Name

Visiting Asst. Researcher
Title
Ocean Physics Laboratory
6487 Unit A, Calle Real
University of California, Santa Barbara
Goleta, CA 93117
Mailing Address

805-893-8207 Office Telephone
831-656-2217 Alternate Telephone

VII. A. RESEARCH INVOLVING HUMAN SUBJECTS
☐ YES ☒ NO Approved _____ Date
Pending Review: ☐

B. RESEARCH INVOLVING ANIMAL SUBJECTS
☐ YES ☒ NO Approved _____ Date
Pending Review ☐

VII. ENDORSEMENTS:

	Principal Investigator	Department Head or ORU Director	Authorized UCSB Official
Signature:			
Name:	Grace C. Chang	Oliver Chadwick	Lynne Van Der Kamp
Title	Associate Researcher	Department Chairman	Sponsored Projects Officer
Department/ ORU/Other:	Geography	Geography	Office of Research
E-mail:	grace.chang@opl.ucsb.edu	oac@geog.ucsb.edu	van@research.ucsb.edu

Authorized University Negotiator & Office to Whom Award Documents Should be Mailed:

Lynne Van Der Kamp, Sponsored Projects Officer
3227 Cheadle Hall
University of California, Santa Barbara
Santa Barbara, California 93106-2050
Telephone No.: (805) 893-5687

Date Mailed by Office of Research NOV 22 2006

UCSB/OR
Form 104A (Rev. 1/04)

SCCOOS: Shelf to Shoreline Observatory Development

Grace Chang and Erika McPhee-Shaw
University of California Santa Barbara

Project Period: July 1, 2007 – June 30, 2008

Statement of Work

Understanding of the delivery of nutrients, particles, and pollutants to the nearshore coastal zone is of crucial importance for monitoring water quality, beach erosion, and the health of coastal ecosystems such as giant kelp forests, and determining the causes and transport of episodic harmful algal blooms and high pollutant levels along the Southern California coast. Here, we describe the SCCOOS mooring, an important component of a coastal observatory that measures time series of depth-resolved interdisciplinary processes on the continental shelf off Southern California. The primary objectives are to monitor cross-shelf transport processes, to document exchange between shallow, inner-shelf waters and continental shelf-break waters, and to determine how these processes affect water quality, turbidity, nutrient supply, and ecosystem dynamics.

As part of the SCCOOS program, we maintain a mooring in the Santa Barbara (SB) Channel. This mooring is deployed at the continental shelf break in 80 m water depth, directly offshore of an existing interdisciplinary mooring (CHARM; 25 m water depth; see http://www.opl.ucsb.edu/mosean.html). Specific instruments on the SCCOOS mooring include a near surface-mounted downlooking Acoustic Doppler Current Profiler (ADCP), temperature sensors at every 5 m, and a 10 m bio-optical package containing a fluorometer, turbidity meter (light scattering sensor), and photosynthetically available radiation (PAR) meter. We propose to purchase, interface, and deploy a conductivity-temperature (C-T) at 10 m depth. We will also purchase and deploy a meteorological system on the surface buoy.

The SCCOOS mooring is serviced (recovered, sensors cleaned, data downloaded, batteries replaced, and redeployed) twice per year. Recent changes in Southern California Bight complementary programs have reduced the amount of available ship-time for SCCOOS mooring servicing. Therefore, we are working with other SCCOOS mooring programs [Santa Monica Bay (UCLA) and off San Diego (UCSD Scripps)] to coordinate ship-time and streamline operations.

We have implemented a portion of our real-time data telemetry system, a self-contained GPS receiver and transmitter. This system provides real-time GPS data to a web interface to ensure safety of the SCCOOS mooring. We propose to telemeter the oceanographic data from the ADCP and 10 m bio-optical package (including C-T, fluorometer, turbidity, PAR, and dO sensors) in real-time. We are exploring several options for real-time telemetry: (1) cellular telephone technology, (2) VHF radio transmission, and (3) Iridium satellite communications through Upward Innovations. Our choice of telemetry systems will be based on coordination with other SCCOOS moorings in Santa Monica Bay and off San Diego. Our data will be sent to the Internet, where we can access datasets online. Processed, quality controlled data will be pushed to a SCCOOS central server.

Time series measurements provided by moorings are essential for monitoring coastal water quality; and for observing the evolution of harmful algal blooms, climate variability, and El Niño/Southern Oscillation (ENSO) related processes. Climate variability leads to dramatic differences in rainfall from year to year, and processes such as ENSO can cause wide variations in temperature, water-column stratification, and runoff over the entire Southern California Bight.

These lead to abrupt changes in habitat and nutrient supply, often with adverse effects on coastal ecosystems and fisheries. Mooring time series spanning the water column can capture these very low-frequency temporal variations and monitor the effects of interannual variation on pollutant delivery, erosion, and re-distribution of sediment and contaminants, and changes in the vertical hydrographic and current structures and associated effects on nutrient and particle transport from deep waters to shallow surface waters. High resolution time series measurements telemetered in real-time from moorings can be used by managers and those responsible for the health and well being of the coastal zone.

The SCCOOS mooring benefits greatly through linkage with the CHARM, an ongoing mooring that includes high-resolution, real-time telemetry measurements of currents, hydrography, and bio-optical and chemical variables. The mooring is also associated with a number of ongoing monitoring programs already in place in the Southern California Bight. These programs include PISCO (Partnership for Interdisciplinary Studies of the Coastal Ocean) and the SB Channel LTER (Long Term Ecological Research) project, which primarily monitor conditions on the shallow, inner shelf.

Until the SCCOOS program was implemented, most of the long time series in the SB Channel region have been located in the shallow inner shelf or in mid-basin waters; the SCCOOS mooring provides a crucial link between these two regions and provides data at a depth-resolution rare in California long-term moorings. Importantly, we now begin to assess the outer shelf conditions associated with onshore transport of micro- and macronutrients affecting the health of inner-shelf ecosystems and the timing of phytoplankton blooms. Pulses of elevated chlorophyll, each persisting about eight days, were seen during spring 2005 upwelling, but several intense bloom events were also observed in early fall 2005. Interestingly, comparison of SCCOOS mooring data to shallow data from the SBC-LTER moorings showed that these fall events did not have an inner shelf signature. This points out a limitation of pier-based and other very shallow coastal observing systems, yet also demonstrates how the synergistic coordination of various observing efforts can dramatically enhance our ability to understand the coastal system. Comparison to time series collected by the SB Channel LTER and CHARM will also allow us understand to what extent the density structure over the outer shelf controls the characteristics of upwelling and internal waves which are known to be an important source of nutrients and cold water to the inner shelf. These long time series will increase our understanding of bloom dynamics and the transport of benthic material and pollutants in the Southern California Bight (SCB).

Education and Outreach

Data sets collected on the SB Channel SCCOOS mooring are used extensively in graduate course work at Moss Landing Marine Laboratories (MLML), San Jose State University. Dr. McPhee-Shaw uses the data in a course entitled “Coastal Processes” in training students how to analyze coastal currents, examine tidal variation, and understand concepts such as dynamic boundary layers and stratification over continental shelves. SCCOOS data have been used by a current MLML M.S. student, Lauren Sassoubre, to look at timing of the onset of upwelling in temperature records along the California coast. The SCCOOS mooring proves very useful because it is one of the only moorings actually located on the mid-depth continental shelf in this entire region. The data are also being used by Francois Cazenave, another MLML M.S. student, who is working with Dr. McPhee-Shaw and researchers from the Monterey Bay Aquarium Research Institute on algorithms for tracking continental shelf internal bores with autonomous

underwater vehicles (AUVs). Since, as mentioned above, there are so few moorings at mid-shelf depths, data from both SCCOOS moorings are crucial for Mr. Cazenave to define the important parameters of internal bore processes and understand their temporal variability at seasonal and other scales. In the upcoming few months, Dr. McPhee-Shaw will be giving a presentation about coastal oceanography to students at Notre Dame High School, an all-girls school in Salinas, CA and will also give a presentation in a public seminar series about coastal processes and continental margin science; examples of science based on these moorings and other SCCOOS monitoring products will be used in both presentations.

NOAA SCCOOS: Shelf to Shoreline Observatory Development
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
P.I.: **Grace Chang, Associate Researcher**
Co-P.I.: **Erika McPhee-Shaw, Assistant Researcher**
Period: **July 1, 2007 - June 30, 2008**

	Period 7/07-6/08
PERSONNEL/SALARIES:	
Grace Chang, Associate Researcher II & Assoc III, P.I.	
1.5 mon @ 100% $6,050 /mo	9,075
Erika McPhee-Shaw, Assistant Researcher IV, Co-P.I.	
1.0 mon @ 100% $6,050 /mo	6,050
Derek Manov, Principal Development Engineer	
2.0 mon @ 100% $9,033 /mo	18,066
Frank Spada, Assistant Development Engineer	
3.0 mon @ 100% $4,561 /mo	13,683
TOTAL PERSONNEL COSTS	**46,874**
FRINGE BENEFITS:	
Grace Chang, Associate Researcher II & Assoc III, P.I.	
9,075 @ 27.47% (actual rate)	2,493
Erika McPhee-Shaw, Assistant Researcher IV, Co-P.I.	
6,050 @ 17.00%	1,029
Derek Manov, Principal Development Engineer	
18,066 @ 22.00%	3,975
Frank Spada, Assistant Development Engineer	
13,683 @ 26.09% (actual rate)	3,570
TOTAL FRINGE BENEFITS COSTS	**11,067**
EQUIPMENT: (Sales tax is included)	
ADCP's, Physical, Bio-optical sensors:	
Microcats 1 @ $5,000	5,000
METS package 1 @ $5,000	5,000
EQUIPMENT TOTAL:	**10,000**
TRAVEL:	
Professional Conferences:	
2 RT SB to TBD site to attend planning meetings and present research results	
Private car mileage reimbursement: 575 miles @ $0.445/mile x 2 trips x 2 people	1,024
Per diem including lodging @ $179/day x 2 days x 2 trips x 2 people	1,432
TOTAL TRAVEL COSTS:	**2,456**

	Period 7/07-6/08
OTHER DIRECT COSTS:	
Materials & Supplies	
Research/lab supplies including batteries, mounting brackets, etc.	10,000
OTHER DIRECT COSTS:	
Ship-time	
Small to intermediate local vessels for mooring operations	15,000
Publication Costs:	1,200
Computer Connection Costs:	500
Other	
Instrumentation re-calibration	1,000
Telephone/fax tolls, express delivery costs	344
* Facilities (lab) rental and maintenance, i.e. estimated use of approx. 850 feet^2 per year @ \$1.82/foot^2/month; this also includes facility maintenance @ 20% for each project.	18,564
TOTAL OTHER DIRECT COSTS:	**46,608**
TOTAL DIRECT COSTS:	117,005
** **INDIRECT COSTS @ 26% of MTDC:** \$ 88,441	22,995
TOTAL PROJECT COSTS:	**\$ 140,000**

* Facilities rental and maintenance costs are included in the budget for the Ocean Physics Laboratory (OPL) where majority of the research will be carried out. OPL is located off UCSB campus. Indirect costs rate of 26% on the MTDC applies. The MTDC excludes equipment and facilities rental.

** This is the DHHS negotiated, predetermined, off-campus rate for Research Projects covering the period 7/1/00 to 6/30/03. The rate thereafter is provisional.

SCCOOS: Shelf to Shoreline Observatory Development
Grace C. Chang and Erika McPhee-Shaw
University of California, Santa Barbara
July 1, 2007 – June 30, 2008

Budget Justification
Total 2007-2008: $140,000

Major categories for the proposed budget include:

(a) Salaries – For: the P.I.s Drs. Grace Chang (1.5 months) and Erika McPhee-Shaw (1 month) who will be responsible for coordination of SCCOOS, data processing, management, and dissemination, presentation of results, and participation in mooring deployments; and OPL engineers (Derek Manov and Frank Spada) who will engineer, assemble, and deploy and recover/redeploy the mooring. Two months salary are requested for Mr. Manov for testing and implementation of the new real-time data telemetry system. Three months salary are requested for Mr. Spada.

(b) Benefits are projected according to the University system-wide schedule.

(c) Equipment funds are requested for two new sensors: Microcats for conductivity and temperature and METS for meteorological parameters. The anticipated long-term use of this equipment makes the purchase (vs, leasing) option more cost effective.

(d) Expenses for Drs. Chang and McPhee-Shaw to travel from Santa Barbara to TBD locations for SCCOOS meetings. Estimate two 2-day trips per year for two P.I.s to travel approximately 575 miles round trip by private vehicle, totaling $1,023 ($0.445 per mile x 575 miles) x 2 people x 2 trips per year. Estimated lodging plus meals is $1,432 ($64 per day meals + $115 per day lodging) x 2 trips x 2 people x 2 days.

(e) Other Direct Costs include miscellaneous research supplies. Supply costs for purchasing replacement mooring hardware (for safety reasons, hardware should be replaced once per year) and sensors are allocated as follows:

Mooring supplies	**Qty**	**Cost**	**Total**
Mooring Hardware	1	$3,400	$3,400
Telemetry system and/or communication		$3,100	$3,100
Onset Computer Corp. temperature sensors	10	$250	$2,500
Batteries		$1,000	$1,000
TOTAL			**$10,000**

All supplies are for research work.

Costs for ship-time are requested anticipating the use of a small to intermediate local (Los Angeles area) vessel at a rate of approximately $1,200/day. Steam time from Los Angeles to Santa Barbara is roughly 20 hours round-trip. Mooring operations are generally conducted over a period of two days separated by two to three days for instrument reconditioning. Ship time will

be shared with other SCCOOS mooring operators whenever possible. We are anticipating a total ship time of 12.5 days for the year for a ship operations budget of $15,000**.**

Publication costs are requested for data reporting and dissemination purposes.

Computer costs, including maintenance of existing systems, software upgrades (MATLAB, IDL, etc.), and miscellaneous computing supply items, are budgeted.

Instrument re-calibration costs are requested; to ensure data accuracy and stability, bio-optical instrumentation will be factory calibrated when time permits.

Telecommunications and delivery costs have been included.

UCSB will apply an off-campus overhead rate of 26%. However, being off-campus will require us to pay rental fees for our space and associated expenses (see "Facilities Rental and Maintenance" category under OTHER"). The sum of the Facilities costs and the off-campus overhead rate will not exceed the on-campus overhead rate of 47%.

Federal Employer's Id# **95-6006145W**
Congressional District: 23rd

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
c/o University of California, Santa Barbara
Santa Barbara, California 93106

I. PROPOSAL SUBMITTED TO:

Dr. Eric Terrill
MPL
Ocean Atmos Res Facility, Rm 253
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0213

II. TITLE OF PROPOSAL:

SCCOOS: Shelf to Shoreline Observatory Development.

III. PROJECT PERIOD:

7/01/07 – 6/30/08 (Continuation NA17RJ1231)

IV. SUPPORT REQUESTED:

$11,714

V. PRINCIPAL INVESTIGATOR:

J. Carter Ohlmann
Researcher
Institute for Computational Earth System Science
Email: carter@icess.ucsb.edu
Office Telephone: (805) 893-5303

J. Carter Ohlmann, Principal Investigator
Institute for Computational Earth System Science

David A. Siegel, Director
Institute for Computational Earth System Science

Authorized University Negotiator
& Office to Whom Award Documents
Should be Mailed:

Lynne Van Der Kamp
Sponsored Projects Officer
Room 3227 Cheadle Hall
University of California
Santa Barbara, California 93106
Telephone No.: (805) 893-5687
Fax No.: (805) 893-2611

Interpretation of HF Radar Velocities With Drifting Buoys
University of California, Santa Barbara
PI: Carter Ohlmann
July 1, 2007 – June 30, 2008

STATEMENT OF WORK

The primary goals of the proposed work are to:

- provide validation of long range HF radar velocities
- quantify sub-HF-radar-grid-scale motions

A drifter study is being proposed to meet these goals. Sets of drifters located within an HF radar radial sector provide space and time averaged surface currents similar to those resolved with HF radar. In contrast, a single current meter mooring provides only a time averaged current at a single location, and not a space average. The eddy kinetic energy associated with mean radar value for a given sector can easily be quantified with drifters. Eddy kinetic energy, or the sub HF radar grid scale variance, can be an important component in the understanding of coastal flows and is not presently obtained from HF radar.

Sets of drifters have demonstrated that "short range" HF radar systems can provide more accurate surface current data (to within ~ 6 cm/s) than originally indicated (within ~10 cm/s). Drifter clusters also show eddy kinetic energy values within a 1 to 4 km^2 can reach nearly 30 $cm^2\ s^{-2}$, a significant amount of energy not captured in HF radar maps. The accuracy of long range HF radar derived currents which are mean values over much larger areas than for standard ("short range") systems and the associated sub grid scale energy are not known.

High resolution Microstar drifters, built by Pacific Gyre Corporation (Carlsbad, CA), are proposed. The Microstar is appropriate for a number of reasons. First, it has extremely high spatial (~5 meter) and temporal (10 minute) resolution, required to resolve the small scales of motion that characterize coastal flows. Second, it is extremely economical. The drifters are recoverable (rather than expendable), and communications costs are only $15 per drifter-month (a factor of 10 less than Argos). Finally, the drifter uses a scaled-down tri-star type drogue with a drag-area-ratio greater than 41 that is centered at ~1 m depth. This gives a vertically integrated current measurement close to that provided by HF radar, and drifter slip is known to be ~0.1% of the wind speed (~1 cm/s in 10 m/s of wind) which is typical of modern-day drifters.

A set of 8 or more drifters will be repetitively deployed during the course of a day in a long range HF radar sector located where radials are orthogonal. This will occur in a yet to be defined location in Southern California. The study will most likely occur off the San Diego coast, but will ultimately depend upon the future installation of long range HF radar systems. The idea is to obtain drifter velocities distributed uniformly over the same time and space scales of HF radar radial measurements. Thus, as drifters move form the radial sector of interest, they will be retrieved and redeployed so as to maintain a spatially uniform distribution within the desired sampling area. Catch-and-release sampling will continue

throughout the day to provide hours of data and capture the daily evolution of sub grid scale energy. This sampling scheme gives flow statistics for the radial sector considered on the same time and space scales resolved with HF radar, along with sub grid scale information.

The drifter study will be carried out by Dr. Ohlmann and technician Kirk Ireson (ICESS/UCSB). Dr. Ohlmann was involved in design and development of the Microstar and has been routinely deploying them over the inner-shelf off the Santa Barbara coast with Ireson (http://www.icess.ucsb.edu/~kirk/drifter/ver2).

MILESTONE SCHEDULE

July 1, 2007 through June 30, 2008
Determine exact sampling time and location, reserve boat, and prepare drifters. Collect data and display raw drifter tracks on the Web in real-time. Process data and compute mean, variance, and dispersion quantities. Discuss HF radar statistics and the drifter – HF radar comparison with the appropriate HF radar investigator. Disseminate results.

Interpretation of HF Radar Velocities With Drifting Buoys
University of California, Santa Barbara
Institute for Computational Earth System Science
PI: Carter Ohlmann

DETAILED BUDGET

SALARIES	Period/ mos.	% Time		**7/1/07-6/30/08**
1. Principal Investigator - Carter Ohlmann Assist. Researcher II @ $5,454 /mo.	0.54	100%	$	**2,945**
2. Oceanographic Technician - K. Ireson @ $3,231 /mo.	0.54	100%		**1,745**
		Salaries Subtotal	**$**	**4,690**

FRINGE BENEFITS

1. Principal Investigator - Carter Ohlmann Base sum: $2,945 @ 17.00%		$	**501**
2. Oceanographic Technician - K. Ireson Base sum: $1,745 @ 22.00%			**384**
	Benefits Subtotal	$	**885**

TRAVEL (increases @ 4% per/yr)

1. Travel to San Diego for field work. 2 people for 3 days and 2 nights			
Van @ $100/day for 3 days		$	**300**
Lodging @ $150/person/night		$	**600**
Per diem @ $50/person/day		$	**300**
	Domestic Travel Subtotal	$	**1,200**

OTHER DIRECT COSTS (increases @ 4% per/yr)

1. Long-distance phone, photocopying, fax and project mailing costs*		$	**194**
2. 1 day boat usage @ $1,000 /day Pacific Tugboat Service, San Diego, CA		$	**1,000**
	Other Direct Costs Subtotal	$	**1,194**
	Total Direct Costs	$	**7,969**

DETAILED BUDGET (Cont.)

7/1/07-6/30/08

INDIRECT COSTS

On-campus rate** of Modified Total Direct Costs					
Base sum:	$7,969	@	47.00%	$	**3,745**
			TOTAL	$	**11,714**

* Costs for communication & duplication of research data to allow collaboration with research team members and with researchers related to this project.

** This is the DHHS negotiated, predetermined, off-campus rate for Research Projects covering to 6/30/03. The rate thereafter is provisional.

Interpretation of HF Radar Velocities with Drifting Buoys
University of California, Santa Barbara
PI: Carter Ohlmann
July 1, 2007 – June 30, 2008

Budget Justification

Salaries
Funds are requested for PI Ohlmann to collect, process, and analyze data, and to collaborate with HF radar investigator Eric Terrill (SIO). Funds are also requested for technician K. Ireson to prepare the drifters and assist in collecting data.

Benefits are projected according to the University system-wide schedule.

Project Specific Supplies and Other Direct Costs
During the course of the project, 8+ Microstar drifters will be deployed (and recovered) off the San Diego (or possibly Orange County) coast during a single day. Funds for the use of a small (~30 ft) boat are requested. Funds are also requested for communications and project specific lab materials.

Travel
Funds are requested for Ohlmann and Ireson to travel to San Diego (or possibly Orange County) for field work. The nature of a long day at sea requires arrival the day before and departure the day after the field day, making for 2 days of lodging and per diem for each person. Travel will be via University vehicle of suitable size to transport Ohlmann, Ireson, and the necessary instrumentation.

CAL POLY
California Polytechnic State University
San Luis Obispo, CA 93407
Grants Development Office
(805) 756-2982 • Fax (805) 756-5466
www.calpoly.edu/~grants • e-mail: grants@calpoly.edu

November 29, 2006

Eric Terrill, CORDC Director
Scripps Institution of Oceanography
La Jolla, CA 92106

Dear Dr. Terrill:

California Polytechnic State University will be pleased to continue our collaboration with Scripps Institution of Oceanography for the Southern California Coastal Ocean Observation system. Enclosed is our proposal for the third year of the project. Dr. Mark Moline will continue to serve as director for this project.

Please note that there is a distinction between the Cal Poly Awardee Institution and the Performing Institution. The Awardee Institution is the Cal Poly Corporation, formerly known as the Cal Poly Foundation. If the contract is awarded, it will be accepted and administered by the Cal Poly Corporation, c/o Jill Keezer, Sponsored Programs Director. The Cal Poly Corporation is a 501(c)(3) non-profit auxiliary organization established in 1940 to aid the University in its educational and extracurricular missions.

The Performing Institution is the California Polytechnic State University. Technical questions about this proposal should be addressed to Mark Moline at (805) 756-2948 or *mmoline@calpoly.edu*. Please feel free to contact Patti Wilhelm at (805) 756-1450 or *pwilhelm@calpoly.edu* if you have any other questions. Contract negotiations, post-award contract and fiscal administration will be handled by the Cal Poly Corporation, Sponsored Programs Department. They can be reached at (805) 756-1123 or *sponprog@calpoly.edu*.

Sincerely,

Michael Fish
Director, Grants Development Office

cc: Mark Moline, Biological Sciences
Patti Wilhelm/GDO proposal #07-152

PROPOSAL

TITLE:

SCCOOS: Southern California Coastal Ocean Observation System

APPLICANT ORGANIZATION:

Cal Poly Corporation
1 Grand Avenue
San Luis Obispo, CA 93407-0830

SUBMITTED TO:

Dr. Eric Terrill
CORDC Director
Scripps Institution of Oceanography
La Jolla, CA 92106
Telephone: 858-822-4098

PRINCIPAL INVESTIGATOR:

Mark Moline
Biological Sciences Department
California Polytechnic State University
1 Grand Avenue
San Luis Obispo, CA 93407-0401
Telephone (805) 756-2948
E-mail: mmoline@calpoly.edu

Date 11/29/06

AUTHORIZED OFFICIAL REPRESENTATIVE:

Michael Fish
Director, Grants Development Office
California Polytechnic State University
1 Grand Avenue
San Luis Obispo, CA 93407-0035
Telephone (805) 756-2982
Fax: (805) 756-5466
E-mail: grants@calpoly.edu

Date 11/29/06

PROPOSED STARTING DATE:

7/1/07

PROPOSED DURATION:

12 Months

AMOUNT REQUESTED:

$30,000.00

Cal Poly State University
NOAA Proposal
PI: Moline
Performance Period: July 1, 2007 – June 30, 2008

Statement of Work

In addition to the ongoing contribution to SCCOOS in terms of governance, goals and outreach, Cal Poly State University (Cal Poly) will contribute to this program by integrating physical and bio-optical observations, validation, model assimilation and model validation into the region. The SCCOOS observation areas that Cal Poly will contribute are with **PHYSICAL PARAMETERS**, **VELOCITY FIELDS**, **ECOLOGICAL FIELDS, BENTHIC HABITAT MAPPING** and **DATA ASSIMILATION**. Specifically, Cal Poly will contribute to observations made by SCCOOS through its AUV program and time-series shore station.

Application of AUVs

Cal Poly has an active AUV program with two REMUS-type AUVs outfitted with an array of optical, biological and physical sensors. The vehicles are easy to transport and are deployed by small boat anywhere in the region or off of Cal Poly's Center for Coastal Marine Studies in San Luis Obispo Bay. A number of applications of this platform to the existing observational capabilities in Southern California will be applied for this program. They include;

- One AUV is outfitted with side scan sonar, capable of mapping habitat types in nearshore waters. Plans for this year include mapping three key areas. 1) The IBWC outfall along the US-Mexico border. This area was initially surveyed to examine plume behavior. In addition to the bottom mapping of the outfall, the plume will also be characterized and compared to near shore waters from the Tijuana River for sources to beach impacts. 2) La Jolla Beach will be surveyed south of the Scripps Pier to La Jolla Cove. This will be for general habitat mapping, as there are local interests in better understanding and tracking change in that region. 3) The Central Coast MPAs will be announced and as part of SCCOOS, we will initiate a preliminary effort to map an MPA site (most likely the Point Buchon area) as a demonstration of capability for longer term monitoring. These deployments will be based on user defined needs in selected areas in the SCCOOS region. **ADDRESSES: WATER QUALITY, HAZARDS, and BEACHES.**
- The SCCOOS effort will also include analysis of the Huntington Beach '06 experiment that concluded in October 2006 after a month-long field effort. The AUVs were run a total of 450km along the beach site every other day over the course of the experiment to examine the behavior of along and cross-shore currents and their impact on the distribution of constituents in the water (i.e. CDOM, Chl a, sediment). Data analysis from this experiment will include data from the AUVs as well as integrating other concurrent observational data. The analysis will be conducted toward a product for the state of California. **ADDRESSES: ECOSYSTEM, WATER QUALITY, BEACHES.**
- There will also be an effort to respond to events that occur in the Southern California region. This response will be in collaboration with other PIs in SCCOOS and will primarily involve the use of the AUV systems. These efforts will be directed at mapping a key region in

response to an event such as an outfall release, harmful algal bloom, beach closures, spill response, and/or needed habitat survey. **ADDRESSES: ECOSYSTEM, HABITAT, WATER QUALITY, HAZARDS, BEACHES, and OIL SPILLS.**

- AUVs data collected from all of these applications and others in the area can be used for data assimilation and validation of the ROMS model. This has been done successfully over the past two years and will continue. Data that could be assimilated include: temperature, salinity, 3D current velocity and direction above and below the vehicle, bathymetry, fluorescence, incoming solar radiation and particle density. **ADDRESSES: ALL OCEAN OBSERVATION NEEDS**

Time Series Station

This station is outfitted with an array of sensors just north of Point Conception. A number of applications of this platform to the existing observational capabilities in Southern California will be maintained for this program. They include:

- Real-time measurements are being made of temperature, salinity, oxygen, fluorescence, turbidity and petroleum florescence at 1 m below MLLW. Additional temperature and salinity are being made throughout the water column by an automated profiler. These measurements are next to a significant recreation area as well as a river outlet and provide real-time information important to nearshore conditions. **ADDRESSES: WATER QUALITY, HARMFUL ALGAL BLOOMS, BEACHES**
- A full meteorological station is producing data on the same platform to provide wind validation data for the wind models as well as a weather resource for the local community. Data is available real-time over the same system as the in-water measurements. **ADDRESSES: ALL OCEAN OBSERVATION NEEDS**

FY 07-08 SCHEDULE – Cal Poly State University

- Coordination and implementation of sampling plan for Southern California. Specifically, this would coordinate with AUV sampling of nearshore (outfalls, near coastal areas < 90 m isobath) and cross-shore transecting. Areas will include Pt. Buchon, Imperial Beach and La Jolla. Data will supplement efforts ongoing with the water districts and with efforts by CalCOFI.
- Maintain AUV data distribution site on the current Cal Poly website (www.marine.calpoly.edu/auv), with automated distribution list for model assimilation.
- Maintain Hydro and Met Station in San Luis Obispo Bay and initiate additional locations if possible.
- Real-time data streaming of time-series shore station (in water and Met data) to SCCOOS for use by the science and user community.

Sponsor: NOAA/JIMO	**Title: Southern California Coastal Ocean Observation System (SCCOOS)** **Cal Poly State University**
Project Term:	**July 1, 2007 - June 30, 2008**

Personnel						
PI: M. Moline, Assoc Prof.	0.00%	Release time @	$105,152	AY	wtu	$0
	80	hours OC @	$80.00	/hr		$6,400
Technician: I. Robbins	160	hours @	$20.00	/hr		$3,200
Technician: J. Morgan	160	hours @	$22.00	/hr		$3,520
					Subtotal Personnel	$13,120
Fringe Benefits						
Faculty/Staff Release @	36.312%					$0
Faculty OC/Summer Salary @	11.74%					$751
Staff fulltime @	47.90%					$3,219
Students @	9.97%					$0
					Subtotal Benefits	$3,970
					TOTAL Personnel Services	**$17,090**
Travel						
Travel for 2 people (2 trips)						
2 RT San Luis Obispo-San Diego, CA - Airfare						$840
1 RT San Luis Obispo-San Diego, private car: 700 miles @ $0.485/mile						$340
Per Diem (7 days for 2 people @ $50/day)						$700
Lodging (7 days for 2 people @$150/day)						$2,100
					TOTAL Travel	**$3,980**
Supplies (< $5,000)						
Batteries						$200
Mooring materials						$152
Hardware						$100
Calibration						$400
Shipping						$300
					TOTAL Supplies	**$1,152**
TOTAL DIRECT COSTS:						$22,222
Indirect Costs @	35%	of Total Direct				$7,778
					TOTAL PROJECT COSTS	**$30,000**

Personnel:
The rates shown are budgetary figures. Actual costs may vary from those delineated. Faculty and Staff salaries will be charged at State of California approved salary levels and other salaries will be charged in accordance with State or Foundation rates in effect at the time of service. Faculty and Staff salaries include a projected annual 4.5% cost of living increase incorporated each July 1. ABS = Adjusted Base Salary.

***Benefits:**
Faculty/Staff benefits are budgeted and include FICA, SUI and Worker's Compensation, retirement, medical, etc. Faculty/Staff benefits for ABS/Smr Salary and Students are budgeted and include FICA and Worker's Compensation. The percentages used for this budget are based on historical averages. Individual's actual rates in effect at the time the service is performed will be charged to the project.

Ship Work: Additional Worker's Comp coverage for Longshoreman Insurance, based on Foundation rate will be required.

***Equipment:**
Cal Poly State University Foundation defines equipment as tangible nonexpendable personal property having a useful life of more than one year and an acquisition cost of $5,000 or more per unit. If required, bidding process will be performed if project is awarded.

* **Indirect Costs: (on-campus)**
The On-Campus rate of 35% Indirect costs are applied at the DHHS negotiated rate effective July 1, 2001, of 35% of MTDC (Modified Total Direct Costs). MTDC excludes equipment, capital expenditures, charges for patient care, tuition remission, rental costs of off-site facilities, scholarships, and fellowships, as well as a portion of each subgrant and subcontract in excess of $25,000 (regardless of the period covered).

Since the Sponsor allows no funds Indirect costs, MTDC are contributed to the program.

***Indirect Costs: (off campus)**
The Off-Campus rate of 15% is applied to this project. This rate applies to projects where no campus laboratories, office, classrooms, library facilities, fields, or other California Polytechnic State University equipment or property is used during the project.

MTDC excludes equipment, capital expenditures, charges for patient care, tuition remission, rental costs of off-site facilities, scholarships, and fellowships, as well as a portion of each subgrant and subcontract in excess of $25,000 (regardless of the period covered).

***Matching Funds:**
Sponsor requires xx% matching funds.

The matching contribution is computed on projected salary, benefit and indirect costs amounts. The actual amount of the match will be computed on actual salaries, benefits, and negotiated indirect cost rates in effect when the work is done.

This may result in matching dollars that are less than the amounts noted; therefore, Line M of NSF form 1030 reflects 90% of the estimated match.

* **SubContractor:**
For budgeted amounts over 50% of the project funds, a letter of justification is required from PI at the time of the proposal development.
Prime cannot be a flow-through agency.
Bid process required for amounts over $5,000.
Sole source justification may be required.

***Travel:**:

Cal Poly State University
NOAA Proposal
PI: Moline
Performance Period: July 1, 2007 – June 30, 2008

Budget Justification

Salaries
Salary funds are requested for 2 weeks of the PI's time from instruction. This time will include participation in the AUV data collection, QA/QC, and ensuring data availability to the project's other PIs. Time also includes meetings and data analysis with the other PIs. Salary is also requested for 2 months of technical time for data collection and data distribution. Along with the salary requests are the fringe benefits that differ with the personnel.

Project Specific Supplies
The materials and supplies budget are for costs associated with consumable supplies related to the field experiment, such as batteries, mooring materials and hardware. Calibration and shipping costs are also included in this category.

Travel
Travel funds are requested for Moline and Robbins for two trips to San Diego: one trip is to attend a SCCOOS planning meeting, and mileage is requested for the second trip for field effort. Air travel, mileage, per diem, and lodging costs are included in this category

Indirect Costs
Indirect Costs are negotiated at a rate of 35% of modified total direct costs for this project.

Jet Propulsion Laboratory
California Institute of Technology

4800 Oak Grove Drive
Pasadena, California 91109-8099

(818) 354-4321

November 22, 2006

Refer to: 82-10105C.TRN

University of California San Diego
Attention: Dr. Eric Terrill
Marine Physical Laboratory
291 Rosecrans Street, Building 106
San Diego, CA 92106

Subject: Letter Revision C to JPL Task Plan Number 82-10105, "Southern California Coastal Ocean Observing System (SCCOOS): Shelf to Shoreline Observatory Development"

Reference: JPL Task Plan 82-10105, Basic, entitled "Southern California Coastal Ocean Observing System (SCCOOS): Shelf to Shoreline Observatory Development," dated February 14, 2005 through Letter Revision B, dated January 18, 2006

Dear Dr. Terrill:

The California Institute of Technology (Caltech), Jet Propulsion Laboratory, a Federally Funded Research and Development Center (FFRDC) for the National Aeronautics and Space Administration (NASA), is pleased to submit one copy of Letter Revision C to the subject Task Plan.

Letter Revision C revises the Scope of Work to include FY 2008 work. The total requested amount is $113,120. The period of performance is extended through June 30, 2008.

Any questions relative to the technical portion of this Task Plan should be directed to the Task Manager, Ben Holt at (818) 354-5473. For contractual or funding concerns, contact the undersigned at (818) 354-4637.

Sincerely,

Nancy Barker
Senior Contract Administrator
Reimbursable Task Order Administration

UCSD CONCURRENCE: _____
(Date)

Enclosure

A. SCOPE OF WORK (FY 2008)

Scope of Work

July 1 2007 - June 30, 2008

Data management:

• Maintain and refine the existing data portal at JPL (OCEANIDS and OurOcean) to receive SCCOOS satellite products, assimilative model products and other data streams, archive and distribute to end users.

* Maintain the JPL SCCOOS data server to receive all the data from the SIO SCCOOS data server for ROMS data assimilation.

* Construct and maintain the JPL SCCOOS ROMS portal to distribute the ROMS nowcast and forecast fields as well as model- derived products.

Modeling:

* Implement the data assimilation module into the ROMS forecast system, and test it in the real-time operational environment.

* Conduct retrospective analysis during the period of interests (e.g., 2003 upwelling event in the Santa Monica Bay) using the ROMS modeling and data assimilation system.

Remote sensing:

•Maintain the existing remote sensing data system for staging both near-real time acquisitions and archival products to JPL portal.

•Acquisition of SAR passes to support selected SCCOOS-related experiments and demonstrations.

COST ESTIMATE (dollars expressed in thousands)

		2008	Total
1.	Workyears	0.43	0.43
2.	Total Direct Compensation (includes Employee Benefits)	65.0	65.0
3.	Travel	-	-
4.	JPL Services	-	-
5.	Procurements		
	Chargebacks	3.9	3.9
	Procurement Subcontracts	-	-
	Procurement Purchases	-	-
6.	Multi-Program Support	12.1	12.1
7.	Total Direct Costs	**81.0**	**81.0**
8.	Allocated Direct Charge	29.1	29.1
9.	Total JPL Costs	**110.1**	**110.1**
10.	NASA Costs	3.0	3.0
11.	**Total Estimated Cost**	**113.12**	**113.12**

BASIS OF ESTIMATE

1. Labor

JPL in-house labor was estimated by the Task Manager and his supporting staff and was based on a grass roots methodology. The period of performance is extended through June 30, 2008.

	2008 (FTEs)
Labor Category	
LJ-LINE MGR-MGR II **(79)**	0.05
LJ-TECH STAFF-SENIOR **(109)**	0.03
LJ-IS&CS-SENIOR **(75)**	0.19
LJ-IS&CS-STAFF **(76)**	0.145
GS TAX	0.016
TOTAL	**0.43**

NOTE: Group Supervisory Tax (GS Tax): Group supervisor Tax is a process for group supervisors (GS's) to automatically collect, allocate, and distribute supervisory time in the appropriate ratios to the cost accounts charged on time cards of the employees in each group.

2. Travel

No travel required for this task.

3. Services

No services required for this task.

4. Procurements

No procurements

5. Chargebacks

Chargeback accounts are for Enterprise Information System (EIS) costs, which consist of telephone, paging, file, and messaging services; Desktop and Network Services (DNS) costs that consist of network and desktop computer-related charges. Currently, chargeback rates vary by individual depending upon the number of subscribed services. Chargebacks are charged per Full Time Equivalent (FTE) on a monthly basis.

6. Multiple Program Charges

The MPS rate applies costs for program management and technical infrastructure. Cost estimates and system application tools will apply the composite rate to all project direct hours charged to projects managed by JPL.

7. Allocated Direct Charges

The ADC rates contain cost elements benefiting multiple work efforts, including Project Direct, MPS, and Support/Services activities. Rate applications for cost estimates are specific to the given category.

8. NASA Costs

a) Director's Research & Development Fund (DRDF): JPL applies the DRDF rate to cost estimates for reimbursable research and development funding to the extent the task utilizes such funds. FY2007 rate: 0.25%; FY2008 rate: 0.27%

b) Award Fee: Sponsors placing funds on contract contribute a percentage of the task order dollars to the award fee. Cost estimate will apply the rate to the sum of total Direct and Allocated Direct Charge (ADC) for total cost estimates that are $250,000 or more. Current rate: 1.4%

c) NASA G&A: NASA applies this rate to reimbursable work. Cost estimate will apply the rate to the sum of total Direct, Allocated Direct Charge (ADC), DRDF, and Award Fee. Current rate: 1%

9. Miscellaneous

An audit report, dated February 15, 2006, performed by the DCAA San Gabriel Valley Office indicated JPL's cost accounting standards are adequate and compliant. Mr. Albert Battistelli, JPL Audit Liaison Office, 818-354-2425, can provide more detail on the report, if requested.

JPL's cost estimation rates and factors are in compliance with JPL's disclosed practices and in accordance with generally accepted government auditing standards.

OCEAN INSTITUTE

EXPERIENCE IS THE TEACHER

UCSD 2007-1103

Ocean Institute
Statement of Work
NOAA
PI: Helling
Period of Performance: July 1, 2007 – June 30, 2008

The Ocean Institute in Dana Point is a non-profit ocean education center that hosts over 90,000 K-12 students per year through 60 field science courses aboard the vessel R/V Sea Explorer, in the new 33,000 sq. ft. Ocean Education Center, in the Dana Pt. Marine Life Refuge, at Catalina Island and with the Ocean in Motion traveling classroom.

The Ocean Institute will continue development of a model outreach and education project testing effective methods for integrating SCCOOS products into 5th grade public classrooms. The SCCOOS outreach program will consist of four primary components: a) ***Teacher Professional Development*** – a one day workshop and field cruise for teachers showcasing SCCOOS scientists, equipment, protocols and products; b) ***Weather and Water Field Explorations for Students*** – field trips to OI where students visit a working CDIP buoy and, conduct solar, CTD and sea-surface measurements and correlate buoy reading with real-time observations; c) ***Weather and Water Classroom Curriculum*** – continue development of a comprehensive 9-week Weather and Water Curriculum and Science Kit that utilizes SCCOOS products to support 5th grade science assessments and California Science Content Standards in Earth and Physical Sciences; ***d) Weather and Water Dissemination Pilot*** – test the viability of dissemination of curriculum through a train-the-trainer program, development of a listserv community of Weather &Water teachers and testing adaptability in areas outside of Orange County.

The Ocean Institute will participate in iterative dialogue with SCCOOS web developers and researchers working toward the implementation of web-based solutions for integrating SCCOOS products into 5th grade classrooms.

The Ocean Institute agrees to perform the stated work for $43,696.

Harry Helling
Executive Vice President
Ocean Institute

11-21-06
Date

24200 Dana Point Harbor Drive, Dana Point, California 92629
Tel: 949.496.2274 · Fax: 949.496.4296 · Web: www.ocean-institute.org

SCCOOS Education and Outreach Budget for Ocean Institute (July 1, 2007 through June 30, 2008)		
Personnel	S. Magdizarz, CORE Project Coordinator- 1/3 FTE @ $36,870 annual	12,167
Fringe Benefits	19% benefits on salary	2,312
Teacher Professional Development	Train-the-trainer (3 teacher/ISC teams)	3,600
Travel	Conference presentations; trips to partners	1,200
Field Explorations	Transportation: 3 schools x 4 classes x $450 = $5,400; Dissem. ISC partners 3 schools x 4 classes x 650 = $7,800; Transportation: Berg and Chap $800 x 2days = $1,600	14,800
Equipment & Supplies	Kits, transparancies, DVD reproduction, misc weather equip for OI teaching stations; misc.; printing costs; consumable lab supplies, listserv fees; Informal Science Center teaching stations	5,273
Total Direct Charges		39,352
Indirect Charges	30% of Salary and Benefits	4,344
Total		**43,696**

SCCOOS Education and Outreach
Ocean Institute
July 1, 2007 through June 30, 2008

Budget Justification

a. Personnel: Salary for Susan, Magdizarz, Center for Cooperation in Research and Education (CORE), Project Coordinator: .33 FTE Coordinator @ $36,870 annual.

b. Fringe Benefits: Calculated at 19% of salaries and wages.

c. Teachers: Teacher Professional Development/Train-the-Trainer Program for 3 teacher/informal science center teams at $1,200 each.

d. Travel: Allocation for travel to dissemination partners and conference. presentations.
Total =- $1,200; Travels to conference for 1 person @ $500 each (location to be determined); includes travel to partners at California Science Center, SIO and UCSB; total 1,000 miles x .39/mile = $390; two nights lodging for partners in Dana Point @ $155/night.

e. Field Explorations: Informal Science Center facility fees and transportation costs for total of 19 5th grade classes.

f. Supplies: Kits, transparencies, DVD reproduction - $1,500
Misc. weather supplies for OI teaching stations - $500
Printing costs, consumable lab supplies, listserv fees - $1,023
Development of partner teaching stations (lab supplies and glassware for evaporation experiment and differential heat experiment, maps and teaching aides for weather mapping demonstration) - $2,250

g. Indirect charges: 30% of personnel and fringe benefits.

USC
UNIVERSITY
OF SOUTHERN
CALIFORNIA

November 21, 2006

VIA DHL

ATTN: Debi Pollard
Marine Physical Laboratory
Scripps Institution of Oceanography
University of California, San Diego
291 Rosecrans Street
Building 106, Room 134
San Diego, CA 92106
(858) 822-4098

Department of
Contracts and Grants

SUBJECT: Proposal entitled "*Three-Dimensional Water Quality Mapping with Autonomous Vehicles (Gliders)*"

Principal Investigator (PI):	Dr. Burton Jones
Total funds requested:	$35,000
Period of Performance:	07/01/07 – 06/30/08

We are pleased to forward for your review and consideration the subject proposal, which has been approved by the Administration of the University of Southern California.

Should you have any questions or require further information that is administrative in nature, please do not hesitate to contact me at the address provided below. Or you may call (213) 740-1894, or email: vnichols@ooc.usc.edu
Please address all technical inquiries to our Principal Investigator.

We look forward to your favorable response to this proposal.

Sincerely,

Vanessa M. Nichols
Contract and Grant Administrator

Enclosures

CC: PI Burton Jones/file

University of
Southern California
Los Angeles,
California 90089-1147
Tel: 213 740 7762
Fax: 213 740 6070
web page:
www.usc.edu/dept/
contracts/

USC
UNIVERSITY
OF SOUTHERN
CALIFORNIA

Proposal Entitled:

"Three-Dimensional Water Quality Mapping with Autonomous Vehicles (Gliders)"

Submitted to:

Scripps Institution of Oceanography

Marine Physical Laboratory
291 Rosecrans Street, Bldg 104/ MC 0701
San Diego, CA 92106-0701

Amount Requested: $35,000

Submitted by:

University of Southern California
University Park
Los Angeles, CA 90089-1147

Burton Jones
Principal Investigator
November 21, 2006

Approved for the
UNIVERSITY OF SOUTHERN CALIFORNIA

By: George-Ann Cleary

George-Ann Cleary
Sr. Contracts and Grants Administrator
Department of Contracts and Grants

Title: Three-dimensional Water Quality Mapping with Autonomous Vehicles (Gliders)

Burton Jones
University of Southern California

Statement of Work:

The Glider Water Quality Mapping component will provide three-dimensional maps of oceanographic and water quality properties on the continental shelf, complementing the larger scale mapping carried out using Spray gliders deployed by D. Rudnick (SIO/UCSD) off the continental shelf. By deploying multiple gliders simultaneously a larger area can be covered than by a single glider. The gliders will carry sensors for measurement of physical properties (depth, temperature, salinity) and bio-optical properties (WetLabs ECOPuck backscatter/fluorescence sensors) including chlorophyll fluorescence, CDOM fluorescence, cyanobacteria fluorescence and optical backscatter at 3 wavelengths. These measurements are used for monitoring issues of concern for coastal water quality in southern California:

1) Coastal runoff from winter storms and the evolution of these runoff plumes in time. These plumes may contribute to the development of harmful algal blooms, dispersion of toxicants, and increased health risks from pathogenic microorganisms.
2) Sewage outfall plumes are effectively tracked using a combination of temperature, salinity, CDOM, and perhaps optical backscatter.
3) Algal blooms, including harmful algal blooms (HABs) can be mapped using the bio-optical measurements.
4) The bio-optical measurements can be used for validation of remote sensing ocean color imagery.

The Webb Research Slocum gliders will be deployed for periods of 2-3 weeks during which they can cover distances on the order of 500 km. Telemetry back to shore will provide for near-real time display on the web and for revision of the mapping plan should it be indicated by remote sensing or other observations.

The following task will be carried out as part of this component:

1) Deploy the glider in San Pedro Bay during winter wet weather events to follow the evolution of the resultant runoff plumes over the continental shelf. A second glider, purchased through the USC NOAA MERHAB project will be used to complement this glider either in space, or time, to evaluate the response of algal blooms to the runoff events. Deployments for each glider will last for 2-3 weeks.
2) The glider(s) will also be used to map and track the evolution of algal blooms over the shelf, particularly if it is determined that these blooms are harmful algal blooms such as a species of *Pseudonitzschia*.
3) POTW outfall plumes will be tracked over extended distances using the autonomous gliders. Little is known about the spatial extent of these plumes, except that they are known to remain intact for extended distances from the discharging outfall diffusers.

During deployments, data will be uploaded via Iridium satellite telemetry and made available through the SCCOOS web site. These data sets are expected to be useful for input into the physical models, for tracking of features important to water quality managers and regulators, and to basic understanding of the interaction between coastal discharges and coastal ocean processes.

Budget Justification:

Personnel:
One month of principal investigator (Burton Jones) time is requested for management of operation, for development of user-oriented products, and for interpretation of the data sets obtained. One month of TBN engineer/technician time is requested for glider maintenance, data processing and management, and deployment/recovery operations. The USC Fringe Benefit rate is 30% of salaries.

Travel costs include $1485 for sending a technician to a glider training session at Webb Research Corporation, Falmouth, MA. Additional travel costs include round trip mileage from USC to the Southern California Marine Institute (SCMI) in Los Angeles Harbor (6 round trips, 55 miles per trip, $0.445/mile for a total of $147) for glider deployments and recoveries.

Materials and Supplies ($700) include batteries and miscellaneous hardware required for operation maintenance of the vehicle. Communications costs include Iridium satellite communications costs (estimated at approximately 630 minutes x $1.59/minute) and additional costs for faxes, regular phone charges, etc. Boat costs include the costs for chartering a small boat from the Southern California Marine Institute for deploying and recovering the gliders. We estimate these costs for 12 hours of boat time at approximately $85/hour.

The overhead rate (63%) applies to modified direct costs (MDC). MDC is the total direct costs less the costs of permanent equipment, defined as equipment items costing more than $5,000.

Budget:

Title:	Three-dimensional Water Quality Mapping with Autonomous Vehicles (Gliders)				
Principal Investigator:	Burton Jones				
Period:	7/1/2007 - 6/30/2008			2007-08	Total
Senior Personnel		Man Months			
B. Jones		1		$8,750	$8,750
Total Senior Personnel				$8,750	$8,750
Technician (TBN)		1		$4,375	$4,375
Total Salaries and Wages				$13,125	$13,125
Fringe					
Benefits			30%	$3,938	$3,938
Total Sal. + Fringe				$17,063	$17,063
Permanent Equipment	None				
Travel					
	Travel for glider training				
	Airfare:		$435		
	Auto Rental	5 days @ $40/day	$200		
	Meals	5 days @ $45/day	$225		
	Hotel	5 days @ $125/day	$625		
	Mileage (USC to SCMI)				
	6 Roundtrips * 55 mi /RT * 0.445/mile		$147		
	Travel Subtotal:			$1,632	$1,632
Other Direct:					
Materials and supplies				$700	$700
Communications (Phone, FAX, etc.)				$1,057	$1,057
Boat Costs				$1,020	$1,020
Total Other Direct				$2,777	$2,777
Total Direct Cost (TDC):				$21,472	$21,472
Modified Direct Costs (MDC = TDC less equipment)				$21,472	$21,472
Indirect costs	(63% of MDC)		63.0%	$13,528	$13,528
Total Direct and Indirect				$35,000	$35,000

APPENDIX B

Key Participant Curricula Vitae
(Alphabetical by Investigator)

GRACE C. CHANG

Associate Researcher
Ocean Physics Laboratory / University of California Santa Barbara
6487 Calle Real Suite A, Goleta, CA 93117 U.S.A.
Phone: 805-681-8207; Fax: 805-967-5704
E-mail: grace.chang@opl.ucsb.edu; Website: http://www.opl.ucsb.edu/

Education

Ph.D. (Marine Science) University of California Santa Barbara, December 1999
Dissertation title: "Analyses of bio-optical variability related to physical processes on the southern New England continental shelf: July 1996 – June 1997"
M.S. (Mechanical and Environmental Engineering) University of California Santa Barbara, June 1997
B.G.E. (Geological Engineering) University of Minnesota Twin Cities, June 1995
B.S. (Geology) University of Minnesota Twin Cities, June 1995

Professional Experience

2004 - present	Associate Researcher, Ocean Physics Laboratory, University of California Santa Barbara
2002 - 2004	Assistant Researcher, Ocean Physics Laboratory, University of California Santa Barbara
2000 - 2001	Post-graduate Researcher, Ocean Physics Laboratory, University of California Santa Barbara
2000	Research Scientist, Florida Environmental Research Institute
1998 - 1999	Graduate Student Peer Advisor, Graduate Division, University of California Santa Barbara
1995 - 1999	Graduate Student Researcher, Ocean Physics Laboratory, University of California Santa Barbara

SCCOOS-related experience

Dr. Chang has extensive experience in the area of oceanographic research using autonomous sampling platforms, e.g., moorings. She has worked on bottom boundary layers and sediment resuspension and transport, internal solitary waves, frontal processes, thermodynamics, biogeochemical cycling, ecosystem dynamics and harmful algal blooms, and theoretical optics and bio-optics in several coastal systems: Santa Barbara Channel, coastal NJ, and south of Cape Cod, MA. She has familiarity in data integration of several different types of measurement platforms (moorings, tripods, shipboard measurements, autonomous underwater vehicles, etc.) that were deployed simultaneously off NJ as part of a coastal observatory. Dr. Chang was an invited co-chair at the MTS/IEEE Oceans '06 conference, Ocean Observing Systems: Coastal Observatories, and an invited instructor at the HABWatch Workshop: Real time coastal observing systems for ecosystems dynamics and harmful algal blooms, Villefranche-Sur-Mer, France, June 2003, for sections related to Observational Systems, Inherent Optical Properties, and Apparent Optical Properties. She participated in the ORION observatory workshops in January 2004 and March 2006. She is also familiar with web-based data management and presentation systems.

Selected Recent Publications

Benson, B., G. Chang, D. Manov, B. Graham, and R. Kastner, Design of a low-cost acoustic modem for moored oceanographic applications, Proceedings of The First ACM International Workshop on UnderWater Networks (WUWNet), ACM Press, Los Angeles, CA, 2006.
Chang, G. C. and T. D. Dickey, Interdisciplinary sampling strategies for detection and characterization of harmful algal blooms, in: Realtime Observation Systems for Ecosystem

Dynamics and Harmful Algal Blooms, edited by: M. Babin, C. Roesler, and J. Cullen, UNESCO, Paris, France, in press, 2006.
Chang, G. C. and R. W. Gould, Jr., Comparisons of optical properties of the coastal ocean derived from satellite ocean color and in situ measurements, Optics Express, in press, 2006.
Chang, G. C., A. H. Barnard, S. McLean, P. Egli, C. Moore, J. R. V. Zaneveld, T. D. Dickey, and A. Hanson, *In situ* optical relationships and variability in the Santa Barbara Channel: Implications for remote sensing, Appl. Opt., 45(15), 3593-3604, 2006.
Chang, G. C., Dickey, T. D., and M. Lewis, Toward a global ocean system for measurements of optical properties using remote sensing and *in situ* sensors, in: Manual of Remote Sensing, Vol. 6, Ch. 9, edited by J. Gower, pp. 285-326, 2006.
Dickey, T., M. Lewis, and G. Chang, Bio-optical oceanography: Recent advances and future directions using global remote sensing and *in situ* observations, Rev. Geophys., 44, RG1001, doi:10.1029/2003RG000148, 2006.
Manov, D. V., T. D. Dickey, and G. C. Chang, Methods for reducing biofouling of moored optical sensors, J. Atmos. Oceanogr. Tech., 21, 958-968, 2004.

Professional Activities

Contracts and Grants

R.A. Iltis, H. Lee, R. Kastner, T. Sherwood, G. Chang, J. Gibson, T. Ha, J. Rice, T. Stanton, W. Su, G. Xie, and L. Ziomek, Department of Defense (MURI), May 1, 2007 - April 30, 2012, "Advanced Channel Estimation, Modulation, Coding and Reconfigurable Hardware for Robust Underwater Communications," Pending

T.D. Dickey and G.C. Chang, Global Navy, "Biological investigations of luminescence, meta-genomes, and ecosystem structure (BioLuMES)," Pending

G.C. Chang, E.E. McPhee-Shaw, and T.D. Dickey, National Oceanographic and Atmospheric Administration, "Southern California Coastal Ocean Observational System (SCCOOS): Shelf to Shoreline Observatory Development," June 1, 2004 - May 31, 2007

T.D. Dickey and G.C. Chang, Office of Naval Research, "High Resolution Time Series Observations and Modeling of Radiance, Optical Properties, and Physical Processes as part of RaDyO," October 1, 2005 - September 30, 2010

T. Cowles, A. Briggs, and G. Chang, Oregon Sea Grant Industry Fellowship (to Briggs), "Developing Optical Proxies as Tools for Coastal Ecosystem Monitoring," May 1, 2005 - April 30, 2007

Reviewer Activity

Reviewer for: Applied Optics; Continental Shelf Research; Estuaries; Estuarine, Coastal, and Shelf Science; Hydrobiologia; IEEE Transactions on Geoscience; Limnology and Oceanography (L&O); L&O Methods; Journal of Geophysical Research; Oceanography Magazine; Science; and UNESCO Publishing; NASA; and NSF

Other

Selected AGU Highlight Article (JGR-Oceans), Chang, G. C. and T. D. Dickey, "Coastal ocean optical influences on solar transmission and radiant heating rate," 2004.

Invited co-chair, MTS/IEEE Oceans '06 conference, Ocean Observing Systems: Coastal Observatories I, II, and III.

Invited Instructor, HABWatch Workshop: Real time coastal observing systems for ecosystems dynamics and harmful algal blooms, Villefranche-Sur-Mer, France, June 2003; Inherent Optical Properties – Data visualization, Apparent Optical Properties – Data post-processing, and Observational Systems.

BIOGRAPHICAL SKETCH

YI CHAO

Joint Institute for Regional Earth System Science and Engineering
9258 Boelter Hall, University of California at Los Angeles
420 Westwood Plaza, Los Angeles, CA 90095-7228
Phone: (310) 206-0377; Fax: 310-206-5219
E-mail: ychao@atmos.ucla.edu

Education

Ph.D. 1988-1990, Atmospheric and Oceanic Science, Princeton University

M.A. 1985-1987, Geophysical Fluid Dynamics, Princeton University

B.Sc. 1980-1985, Atmospheric Physics, University of Science and Technology of China

Professional Experience

2005-present, Adjunct Professor, Department of Atmospheric and Oceanic Sciences and Joint Institute for Regional Earth System Science and Engineering, UCLA

2004-present, Principal Scientist, Jet Propulsion Laboratory, California Institute of Technology

1997-2004, Research Scientist, Jet Propulsion Laboratory, California Institute of Technology

1993-1996, Scientist, Jet Propulsion Laboratory, California Institute of Technology

1990-1992, Post-doctoral Scholar, University of California at Los Angeles

Professional Activities

2006-present, Observatory Steering Committee, ORION (Ocean Research Interactive Observatory Networks) program (http://www.orionprogram.org), National Science Foundation

2005-2006, Cyberinfrastructure Committee, ORION (Ocean Research Interactive Observatory Networks) program (http://www.orionprogram.org), National Science Foundation

2003-present, Executive Committee, Coastal Ocean Current Monitoring Project (COCMP, http://www.cocmp.org), Coastal Conservancy, California

2000-present, Project Scientist, NASA Earth System Science Pathfinder (ESSP) *Aquarius* (http://aquarius.gsfc.nasa.gov/) mission; Responsibilities include leading the *Aquarius* science team, coordinating the *Aquarius* engineering team and organizing the *Aquarius* scientific activities

Five Significant Publications most closely related to project:

Wang, X., and **Yi Chao**, Simulated Sea Surface Salinity Variability in the Tropical Pacific, *Geophysical Research Letters*, *31*, L02302, doi:10.1029/2003GL018146, 2004.

Chao, Yi, Z. Li, J.C. Kindle, J.D. Paduan, and F.P. Chavez, A High-Resolution Surface Vector

Wind Product for Coastal Oceans: Blending Satellite Scatterometer Measurements with Regional Mesoscale Atmospheric Model Simulations, *Geophysical Research Letters*, *30*(1), 1013, doi:10.1029/2002GL015729, 2003.

Chao, Yi, and M.S. Lozier, Evaluation of North Atlantic property field simulations at 1/6^{o}, *Journal of Physical Oceanography*, 31, 3200-3213, 2001.

Chao, Yi, M. Ghil, and J.C. McWilliams, Pacific Interdecadal Variability in this century's sea Surface Temperature, *Geophysical Research Letters,* 27, 2261-2264, 2000.

Chao,Yi, P. Li, P. Wang, D.S. Katz, B.N. Cheng, and S. Whitman, "Ocean Modeling and visualization", book chapter in: Industrial Strength Parallel Computing, 95-111, Morgan Kaufmann Publisher, Edited by A. Koniges, 2000.

Five Other Publications

LeVine, D., C. Koblinsky, F. Pellerano, G. Lagerloef, **Y. Chao**, S. Yueh, W. Wilson, A sensor to measure salinity in the open ocean from space, *International Journal of Remote Sensing,* 25, 1313 – 1318, 2004.

Chai, F., M. Jiang, R.T. Barber, R.C. Dugdale, and **Yi Chao**, Interdecadal Variation of the Transition Zone Chlorophyll Front: A Physical-Biological Model Simulation between 1960 and 1990, *Journal of Oceanography*, 59, 461-475, 2003.

Lowe, S.T., C. Zuffada, **Yi Chao**, P. Kroger, J.L. LaBrecque, L.E. Young, A demonstration observations of 6-cm precision aircraft GPS-reflection ocean altimetry, *Geophysical Research Letters*, 29, 4359-4362, 2002.

Nakamura, M., and **Yi Chao**, Diagnoses of an eddy-resolving Atlantic Ocean model simulation in the vicinity of the Gulf Stream. I: Potential Vorticity, *Journal of Physical Oceanography,* 31, 353-378, 2001.

Li, X., **Yi Chao**, J.C. McWilliams, and L.-L. Fu, A comparison of two vertical mixing schemes in a Pacific OGCM, *Journal of Climate*, 14, 1377-1398, 2001.

Collaborators within the last 48 months

Richard Barber (Duke University), Jim Bellingham (MBARI), Fei Chai (University of Maine), Francisco Chavez (MBARI), Russ Davis (SIO), Kayo Ide (UCLA), John Kindle (NRL), Zhijin Li (Raytheon ITSS), Sharan Mujumdar (University of Miami), James McWilliams (UCLA), Leslie Rosenfeld (NPS), Jeff Paduan (NPS)

Graduate Advisor: George Philander, Princeton University

Postdoctoral Advisors: David Halpern, JPL; C. R. Mechoso, UCLA

Professional Societies

- Member, American Meteorological Society, 1988-present
- Member, American Geophysical Union, 1990-present
- Member, The Oceanography Society, 1992-present

Biographical Sketch

Name **Bruce D. Cornuelle**

Title **Research Oceanographer and Senior Lecturer**
Work address Scripps Institution of Oceanography, University of California, San Diego, 9500 Gilman Dr., La Jolla, CA 92093-0230
Tel & email (858) 534 4021, bcornuelle@ucsd.edu

Professional Preparation
1978 B.A., Physics, Magna Cum Laude, Pomona College, Claremont, CA
1983 Ph.D., Physical Oceanography, Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program
1983-1984 Postdoctoral studies in physical oceanography, Scripps Institution of Oceanography, UCSD

Honors
2002 ASA Medwin Prize for Acoustical Oceanography
Fellow, ASA

Appointments
1999 - pres. Research Oceanographer, Scripps Institution of Oceanography, UCSD
1991-1999 Associate Research Oceanographer, Scripps Institution of Oceanography, UCSD
1985-1991 Assistant Research Oceanographer, Scripps Institution of Oceanography, UCSD
1983-1985 Mellon Postdoctoral Fellow, Scripps Institution of Oceanography, UCSD
1978-1983 Research Assistant, M.I.T.
1999 - pres. Senior Lecturer (unsalaried), Scripps Institution of Oceanography, UCSD
1990 - 1999 Lecturer(unsalaried), Scripps Institution of Oceanography, UCSD
1999 - pres. Director, Physical Oceanography Research Division, SIO, UCSD
1992 - 1999 Assoc. Director, Physical Oceanography Research Division, SIO, UCSD

Five Most Pertinent Publications
Cornuelle, B. D., T. K. Chereskin, P. P. Niiler, M. Y. Morris, and D. Musgrave (2000) Observations and modeling of a California Undercurrent Eddy. *J. Geophys. Res.*, *105*, 1227–1243.
Miller, A. J., E. Di Lorenzo, D. J. Neilson, B. D. Cornuelle, and J. R. Moisan (2000) Modeling Cal-COFI Observations during El Nino: Fitting physics and biology. *California Cooperative Oceanic Fisheries Investigations Reports*, *41*, 87-97.
Miller, A.J., and B.D. Cornuelle (1999) Forecasts from fits of frontal fluctuations. *Dyn. Atm. Oceans*, *29*, 305333 (1999).
Worcester, P. F., B. D. Cornuelle, M. A. Dzieciuch, W. H. Munk, B. M. Howe, J. A. Mercer, R. C. Spindel, J. A. Colosi, K. Metzger, T. G. Birdsall, and A. B. Baggeroer (1999) A test of basin-scale acoustic thermometry using a large-aperture vertical array at 3250-km range in the eastern North Pacific Ocean. *J. Acoust. Soc. Am.*, *105*, 3185-3201.
Send, U., P. F. Worcester, B. D. Cornuelle, C. O. Tiemann, and B. Baschek (2002) Integral measurements of mass transport and heat content in the Strait of Gibraltar from acoustic transmissions. *Deep-Sea Res. II 49*, 4069-4095.

Five Recent or Pertinent Publications
Dushaw, B.D., P.F.Worcester, B.D. Cornuelle, and B.M. Howe (1994) Barotropic currents and vorticity in the Central North Pacific Ocean during summer 1987 determined from long-range reciprocal acoustic transmissions. *J. Geophys. Res. C*, *99*, 3263-3272.
Worcester, P.F., B.D. Cornuelle, J.A. Hildebrand, W.S. Hodgkiss, Jr., T.F. Duda, J. Boyd, B.M.

Howe, J.A. Mercer, and R.C. Spindel (1994) A Comparison of Measured and Predicted Broadband Acoustic Arrival Patterns in Travel Time-Depth Coordinates at 1000-km Range. *J. Acoust. Soc. Am.*, *95*, 3118-3128.

Dushaw, B.D., B.D. Cornuelle, P.F. Worcester, B.M. Howe, and D.S. Luther (1995) Barotropic and baroclinic tides in the central North Pacific Ocean determined from long-range reciprocal acoustic transmissions.*J. Phys. Oceanogr.*, *25*, 631-647 (1995).

Morris, M., D.H. Roemmich, B.D. Cornuelle (1996) Observations of variability in the South Pacific subtropical gyre. *J. Phys. Oceanogr.*, *26*, 2359-2380.

Morawitz, W.M.L, P.J. Sutton, B.D. Cornuelle, P.F. Worcester (1996) Three-dimensional observations of a deep convective chimney in the Greenland Sea during winter 1988/89. *J. Phys. Oceanogr.*, *26*, 2316-2343.

D. Synergistic Activities

Member, WOCE SSC 2000-2002. Associate editor of J. Atm. Ocean. Tech. Served as a reviewer for journals and funding agencies. Advised graduate students (3) and postdocs (3) and currently am a member of 2 Ph.D. thesis committees. I taught a short course on data analysis and inverse methods at the Autonomous University of Baja California, Ensenada, Mexico (April, 1999). Taught a short course in inverse methods at the ASA spring meeting in San Diego, May 1999. On organizing committee of several recent technical meetings and workshops.

E. Collaborators and Other Affiliations

Collaborators

J. C. McWilliams (UCLA), Andy Moore (CU Boulder), Hernan Arango (Rutgers), Uwe Send (IFM-Kiel),
Arthur Baggeroer (MIT), Burkard Baschek (IOS Victoria), Yves Desaubies (IFREMER), Fabienne Gaillard (IFREMER), Virginie Thierry (IFREMER), Robert C. Spindel (APL-UW), Douglas S. Luther (UH), Detlef Stammer (SIO), Peter Niiler (SIO), Ching-Sang Chiu (NPS), Brian D. Dushaw (APL-UW), John A. Colosi (WHOI), Gary D. Egbert (OSU), Andrew Bennett (OSU), Boon Chua (OSU), Peter Mikhalevsky (SAIC), William Kuperman (SIO), William Hodgkiss (SIO), Stanley M. Flatte´(UCSC), Thomas B. Sanford (APL-UW), Murray D. Levine (OSU), James M. Moum (OSU), Craig M. Lee (APL-UW), Michael C. Gregg (APL-UW), Bruce M. Howe (APL-UW)

Advisors

Dr. Carl Wunsch (MIT; Ph.D. advisor) and Dr. Walter Munk, Dr. Robert Knox, and Dr. Peter Worcester
(Postdoctoral advisors, all at UCSD)

Students/postdocs

Phillip Sutton (thesis co-chair, Ph. D., 1993; now at NIWA, Wellington, NZ), Werner Morawitz (thesis committee member, Ph. D., 1995), Chris Tiemann (thesis co-chair, now at SAIC, La Jolla, CA), David Chester (postdoctoral advisor, now at NRL, DC), Virginie Thierry (postdoctoral advisor, now at IFREMER), Josh Willis (thesis committee member, presently at JPL).

Curriculum Vita

Falk Feddersen

Integrative Oceanography Division
Scripps Institution of Oceangraphy
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La Jolla CA 92093-0209
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Education

- Ph.D. Scripps Institution of Oceanography, Physical Oceanography, 1999
- B.S. New York University, Computer Science, 1993 (Phi Beta Kappa)
- B.E. Stevens Institute of Technology, Electrical Engineering, 1993 (Valedictorian)

Research Experience

- 2003-present Assistant Research Oceanographer, SIO
- 2000-2002 Woods Hole Postdoctoral Scholar
- 1999-2000 Post-doctoral Researcher, SIO
- 1997 Participant in SandyDuck Field Experiment, Duck N.C.
- 1993-1999 Graduate Research Assistant, SIO

Professional Activities

- 2004 AGU Fall meeting Nearshore Processes session convenor
- Participant in Five-year NOPP Nearshore Community Model Development
- Reviewer for *J. Phys. Oceangr.*, *J. Geophys. Res.*, *J. Marine Res.*, and NSF

Journal Publications

- Feddersen, F., R. T. Guza, S. Elgar, and T. H. C. Herbers, Alongshore Momentum Balances in the Nearshore, *J. Geophys. Res.*, **103**, 15,667-15,676, 1998.
- Feddersen, F., Weakly Nonlinear Shear Waves, *J. Fluid Mech.*, **372**, 71-91, 1998.
- Lentz S. J., R. T. Guza, S. Elgar, F. Feddersen, and T. H. C. Herbers, Momentum Balances on the North Carolina Inner Shelf, *J. Geophys. Res.*, **104**, 18,205-18,226, 1999.
- Feddersen, F., R. T. Guza, S. Elgar, and T. H. C. Herbers, Velocity Moments in Alongshore Bottom Stress Parameterizations, *J. Geophys. Res.*, **105**, 8673–8686, 2000.
- Ruessink, G. B., J. R. Miles, F. Feddersen, R. T. Guza, S. Elgar, Modeling the Alongshore Current on Barred Beaches, *J. Geophys. Res.*, **106**, 22,451–22,463, 2001.
- Feddersen, F. and R. T. Guza, Observations of Nearshore Circulation: Alongshore Uniformity, *J. Geophys. Res.*, **108**, DOI: 10.1029/2001JC001293, 2003.
- Feddersen, F., E. L. Gallagher, R. T. Guza, and S. Elgar, The Drag Coefficient in the Nearshore, *Coastal Eng.*, **48**, 189–195, 2003.
- Feddersen, F., R. T. Guza, and S. Elgar, Inverse modeling of the one-dimensional setup and alongshore current in the nearshore, *J. Phys. Oceangr.*, **34**, 920–933, 2004.

- Feddersen, F., Effect of wave directional-spread on the radiation stress approximations, *Coastal Eng.*, **51**, 473–481, 2004.
- Feddersen, F. and F. Veron, Wind effects on shoaling wave shape, *J. Phys. Oceangr.*, in press, 2005.
- Feddersen, F. and J. H. Trowbridge, The effect of wave-breaking on surfzone turbulence and alongshore currents: A Modeling Study, *J. Phys. Oceangr.*, in press, 2005.
- Noyes, T. J., R. T. Guza, F. Feddersen, S. Elgar, T. H. C. Herbers, Model-data comparisons of shear waves in the nearshore, *J. Geophys. Res.*, in press, 2005.
- Feddersen F. and A. J. Williams 3d, Direct Estimation of the Reynolds Stress Vertical Structure in the Nearshore, submitted to *J. Atmos. Oceanic Tech.*, 2005.

Ralf Goericke: Curriculum Vita

Integrative Oceanography Division
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La Jolla, CA 92093-0218
Tel.: (858) 534-7970 e-mail: rgoericke@ucsd.edu

Positions

2001 - present	Associate Research Oceanographer Scripps Institution of Oceanography
1993 - 2002	Assistant Research Oceanographer Scripps Institution of Oceanography
1990-1993	Post-Doctoral Investigator Woods Hole Oceanographic Institution

Education

1983-1989	Harvard University	*Biological Oceanography,-Ph.D.* Advisors: N. A Welschmeyer, J. J. McCarthy
1981-1983	Indiana University	*Theoretical Ecology -M.A.* Advisor: J. M. Emlen
1979-1981	University of Kiel	*Vordiplom-Biology*

Teaching Experience Biological Oceanography -- Laboratory Instructor
Introductory Biology -- Section Leader
Mathematical Methods in Biology -- Section Leader

Scholarships and Awards
Woods Hole Oceanographic Institution Post-Doctoral Fellowship, *1990*
S. Riker Fellowship, Bermuda Biological Station, *1986*
W.G. Howard Memorial Scholarship, Harvard University, *1983-1985*
IU/Kiel Exchange - Fulbright Travel Scholarship, *1981*

Field Experience 17 cruises (8 months) in the Sargasso Sea, Pacific, and Chesapeake Bay

Professional Societies
American Society of Limnology and Oceanography
American Geophysical Union

Interests
Physiological Ecology of Phytoplankton
Carbon-cycling in the Open Ocean
Causality, Explanation and Understanding in Science

VITA

NAME: ROBERT T. GUZA

ADDRESS: Integrative Oceanography Division
Scripps Institution of Oceanography
University of California, San Diego
La Jolla, CA 92093-0209, USA
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Home: 5438 Lodi Place
San Diego, CA 92117
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DEGREES:	B.A.	Johns Hopkins University, Physics, 1969
	(M.S.) Ph.D.	University of California, Oceanography, (1971) 1974
POSITIONS HELD:	2001-present	Co-Director, Integrative Oceanography Division
	1994-2001	Director, Center for Coastal Studies
	1975-present	Faculty of Scripps Institution of Oceanography Asst. Prof. (1975-1981), Assoc. Prof. (1981-1987), Prof. (1987-present)
	2004-2006	Adjunct Faculty : Dept Oceanography, Lousianna State Univeristy
	1974-1975	Post-Doctoral Fellow, Dalhousie University

PROFESSIONAL SOCIETIES: American Geophysical Union

CURRENT RESEARCH: Surface gravity waves and wave-driven flows in shallow water
- theory, observations, and numerical modeling

AWARDS:
AGU citation for excellence in refereeing (1990, 1994)
Outstanding Journal Paper Award (Amer. Soc. Civil Eng., Ocean Division, 1991)
AGU Fellow (l993)
AGU Outstanding Student Paper Awards (junior author, w/Okihiro 1991 & Schmidt 2002)
Steinbach Scholar (WHOI, 1996)
Calif. Shore & Beach Preservation Association 2001 award for outstanding contributions to coastal engineering (with Pawka and O'Reilly)

OTHER:
Associate Editor, Journal of Geophysical Research (1984-1988)
Coastal Ocean Processes (CoOP) steering committee member (1988-1991)
SANDY DUCK steering committee member (l992-1997)
California Sea Grant committee member (2000-2001)

CLASSROOM TEACHING: Nonlinear waves, time series analysis, and nearshore processes

CHAIRMAN OF PHD GRADUATES:

R. Flick (co-chair with Inman, 1978)
M. Freilich (1982)
S. Elgar (1985)
J. Oltman-Shay (1985)
M. Merrifield (co-chair with Winant 1989)
E. Melo (1990)
T. Herbers (1990)
W. O'Reilly (1991)
D. King (co-chair with Seymour, 1991)
R. George (co-chair with Van Atta, 1992)
M. Okihiro (co-chair with Seymour, 1993)
B. Raubenheimer (1996)
E. Gallagher (co-chair with Elgar 1996)
F. Feddersen (1999)
T.J. Noyes (2002)
W. Schmidt (2003)

SELECTED PUBLICATIONS

1) Guza, R. T., and R. E. Davis, Excitation of edge waves by waves incident on a beach, *J. Geophys. Res., 79*(9), 1285-1291, 1974.

102) Schmidt, W. E., B.T. Woodward, K.S. Millikan, R.T. Guza, B. Raubenheimer, and S. Elgar, A GPS-tracked surfzone drifter, *J. Atms. Ocean Technol.*, 20, 1069-1075, 2003

103) Feddersen, F., and R.T. Guza, Observations of nearshore circulation : alongshore uniformity, *J. Geophys. Res.*, 108, doi:10.1029/2001JC001293, 2003.

104) Herbers, T.H.C., M. Orzech, Steve Elgar, and R. T. Guza, Shoaling Transformation of Wave Frequency-Directional Spectra, *J. Geophys. Res.*, 108, doi:10.1029/2001JC001304, 2003.

105) Feddersen, F., E. Gallagher, R.T. Guza, and S. Elgar, The drag coefficient, bottom roughness, and wave-breaking in the nearshore, *Coastal Eng.* 48, 189-195, 2003

106) Lentz, S., S. Elgar, and R. T. Guza, Observations of the flow field near the nose of a buoyant coastal current, *J. Phys. Oceanog.,* 33, 933-943, 2003.

107) Noyes, T.J., R.T. Guza, Steve Elgar, and T.H.C. Herbers, Field observations of Shear Waves in the Surf Zone, *J. Geophys. Res.*, 109, doi:10.1029/2002JC001761, 2004.

108) Raubenheimer, B., Steve Elgar and R.T. Guza, Observations of swashzone velocities : a note on friction coefficients, *J. Geophys. Res.*, 109, C1027, doi:10.1029/2003JC001877, 2004.

109) Feddersen, F., R.T. Guza, and S. Elgar, Inverse modeling of one-dimensional setup and alongshore current in the nearshore, *J. Phys. Oceanog.,34*, (4), 920-933, 2004

110) Seymour, R.J., R.T. Guza, W. O'Reilly and Steve Elgar, Rapid erosion of a Southern California beach fill *Coastal Engineering, 52*, (2), 151-158, doi:10.1016/j.coastaleng.2004.10.003, 2004

111) Sheremet, A., R.T. Guza, and T.H.C. Herbers, A new estimator for directional properties of nearshore waves, *J. Geophys. Res.*, 110, C01001, doi:10.1029/2003JC002236, 2005.

112) Gallagher E, Steve Elgar, R.T. Guza, and E. Thornton, Estimating nearshore seafloor roughness with altimeters, *Marine Geology*, 216, (1-2), 51-57, 2005.

113) Hsu, T.J., Steve Elgar, and R.T. Guza, A wave resolving approach to modeling onshore sandbar migration, *Coastal Engineering*, 53,817-824, 2006

114) Schmidt, W. E., R.T. Guza, and D.L. Slinn, Surfzone currents over irregular bathymetry : drifter observations and numerical simulations, *J. Geophys. Res.*, 110, C12015, doi:10.1029/2004JC002421, 2005.

115) Noyes, T.J., R.T. Guza, F. Feddersen, Steve Elgar, and T.H.C. Herbers, Model-data comparisons of shear waves in the nearshore, *J. Geophys. Res.*, 110, C05019, doi: 10.1029/2004JC002541, 2005

116) Henderson, S.M., R.T. Guza, S. Elgar, and T.H.C. Herbers, Refraction of surface gravity waves by shear waves, *J. Phys. Oc.*, 36, 629-635, 2006.

117) Elgar, Steve, B. Raubenheimer, and R.T. Guza, Quality Control of acoustic Doppler velocimeter data in the surfzone, *Measurement Science and Technology, 16*, 1889-1893 (featured on Cover), 2005

118) Thomson, J, S. Elgar, B. Raubenheimer, T.H.C. Herbers, and R.T. Guza, Tidal modulation of Infragravity Waves via Nonlinear Energy Losses in the Surfzone *Geophys. Res. Lett.,*, 33, L05601, doi:10.1029/2005GL025514, 2006.

119) Henderson, S. M., R. T. Guza, S. Elgar, T. H. C. Herbers, and A. J. Bowen, Nonlinear generation and loss of infragravity wave energy, *J. Geophys. Res.*, 111, C12007, doi:10.1029/2006JC003539, 2006

120) Apotsos, A., B. Raubenheimer, S. Elgar, R.T. Guza, and J. A. Smith, Effects of Wave Rollers and Bottom Stress on Wave Setup, *J. Geophys. Res.*, 112, C02003, doi:10.1029/2006JC003549, 2007

121) Spydell, M., F. Feddersen, R.T. Guza, and W. Schmidt, Observing Surfzone Dispersion with Drifters, *J. Phys. Oc.*, in press

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PROFESSIONAL PREPARATION

Institution	Scientific Field	Degree/Year
University of California, San Diego	Marine Biology, Cultural Anthropology	B.A. 1980
California State University, Humboldt	Environmental and Science Education	M.A. 1983
Exploratorium, San Francisco, CA	Kellogg Fellowship for Museum Directors	1984

APPOINTMENTS

1984-present	Executive Vice President, Education and Program Development, Ocean Institute
2005-present	Principal Investigator, National Science Foundation, Information Technology Education for Students and Teachers $896,000: *SeaTech: Underserved Teens Hooked on Ocean Technology!*
2003-present	Principal Investigator, National Science Foundation Informal Science Education, for $862,000 project: *Sea Floor Science*
1999-2000	President, Ocean Institute; oversee fundraising, design/development and construction of new $16.5 million Ocean Education Center
2001-2002	Principal Investigator, Fund for the Improvement of Post-Secondary Education (FIPSE), $1.6 million technology development project
1998-2000	Principal Investigator, California Sea Grant project to develop working cooperative between Scripps Institution of Oceanography and California K-12 students
1994-present	Director, Dana Point Marine Life Refuge

SELECTED PUBLICATIONS AND PRESENTATIONS

Meeson B. W.; McDonnell J.; Kohut; J. Litchenwahler S.; Helling H.. September 2006. *More Than One Way to Catch a Fish: Effective Translation of Ocean Science for the Public.* OCEANS Conference American Geophysical Union. San Francisco, California.

Hellling, H.; Long, J.; Magdziarz, S.; Orcutt, J.; Hildebrand, J.. February 2006. *A New 5th Grade Weather And Water Curriculum Emerges: Collaboration Between the Southern California Coastal Ocean Observing System, the Ocean Institute, and the Center for Ocean Sciences Excellence--California.* Ocean Sciences Conference. Honolulu, Hawaii.

Helling, H. and Solomon, E. Spring 2005 *Translating Thermal Vent Science into the Language of Informal Science Centers*. Current: Journal of Marine Education.

Helling, H. January 2005. *Communicating Science to Public Audiences*. Conference Chair for 2-day workshop for Southwest Marine/Aquatic Educator's Association. Dana Point, California.

Helling, H. December 2004. *It's Not that I Don't Support Education and Outreach, It's Just the Last Thing I Do Before I Submit My Proposal*. American Geophysical Union. San Francisco, California.

Frischer, B., Helling, H., Steinmetz, C., Solomon, E. 2004. *The Port Royal Project. A Case Study in the Use of VR Technology for the Recontextualization of Archaeological Artifacts and Building Remains in a Museum Setting.* Computer Applications and Quantitative Methods in Archaeology Conference. Proto, Italy.

Helling, H. and Solomon, E. 2003. *Bridging the Gap Between Ocean Science and Education: Creating Effective Partnerships through Informal Education Institutions*. Oceans Conference, San Diego, CA.

SYNERGISTIC ACTIVITIES

1. Developing informal science center pedagogical methods and tools targeting improved student performance in national and state science, technology, engineering and math standards assessments. Oversee research and development department, generated over 60 field science and history programs supporting classroom and teacher objectives. Manage standards-based professional development programming for over 900 teachers per year. Project manager for development and construction of six building, $16.5 million informal science center developed specifically to address national science standards and dedicated to testing and delivering state-of-the-art informal science exhibits and programs.

2. Development and testing of broad-based programming serving needs of underrepresented groups in science, technology and workplace training. Created Field Science Cooperative, One Tier Back, Watershed Education Program, Kids' Conferences, Family Immersion Program and SeaTech as model programs for addressing issues in recruitment, retention, parental involvement and internships for underrepresented youth. In 2006, the Watershed Education Program hosted 2,450 students through a 6 month program training underrepresented students to work with researchers, conduct original investigations within their own watershed, present findings at a conference and communicate findings to their community. The Family Immersion Program invites upper elementary underrepresented youths to train as exhibit facilitators who can host families from their school for dedicated science days. Served as advisor on ocean education and sustainable development project in Loreto Bay, Baja California, Mexico.

3. Extensive work on development of broader impact solutions for NSF and NOAA-funded science projects. Founder and Director of Ocean Institute's Center for Cooperation in Research and Education (CORE). PI for NSF-funded *Sea Floor Science* (ISE#0229063) and *SeaTech: Underserved Teens Hooked on Ocean Technology!* (ITEST#0524799); NSF ISE Panel Reviewer January 2004. Significant current broader impact partners include: Southern California Coastal Observing System (NOAA/SIO), Smarter Sensing (WHOI), Long Term Ecological Research Project (SIO), Bubbles and Sea Surface Interactions (SIO), Ecology and Evolution of Methane Seeps (SIO). Serve on advisory board for NSF-funded Center for Ocean Sciences Education Excellence (COSEE).

4. Development of research protocols and programs for marine protected areas; creation of strategies that link monitoring projects directly to management and enforcement plans. Created model program for research and management for regional collection of seven Orange County marine life refuges. Founder of Orange County Marine Life Refuge Committee, created Senate Bill #716 in protection of marine life refuges, raised over $500K funding for projects in research and education.

COLLABORATORS

Dr. Wolf Berger; Director California Space Institute, Scripps Institution of Oceanography
Dr. Cheryl Peach, Center for Ocean Sciences Education Excellence (COSEE)
Dr. Charles Fisher, Director RIDGE2000; Penn State University
Dr. Brian Bingham, Deep Submergence Lab, Woods Hole Oceanographic Institution
Dr. John Hildebrand, Marine Bioacoustics Lab, Scripps Institution of Oceanography
Dr. Randi Korn, Randi Korn & Associates (evaluation)
Dr. Stephen Miller, National Science Digital Library, Scripps Institution of Oceanography
Dr. George Bass, Texas A&M-Institute of Nautical Archaeology
Dr. J. Shipley Newlin, Science Museum of Minnesota
Dr. Roger Payne, Ocean Alliance
Dr. Neal Driscoll, Scripps Institution of Oceanography

Curriculum Vita

BENJAMIN HOLT

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4800 Oak Grove Drive Ben.Holt@jpl.nasa.gov
Pasadena CA 91109

Education

M.S., Physical Oceanography, Dept. of Geology, University of Southern California, 1988.
B.A., Human Biology and Anthropology, Stanford University, 1972.

Professional Experience

NASA Principal Investigator, Oceanography Group, JPL	1991 - present
Alaska SAR Facility Development Project, Project Scientist, JPL	1995 - 2002
Research Scientist, Oceanography Group, JPL	1982 - 1990
Alaska SAR Facility, Deputy Task Scientist, JPL	1986 - 1995
Shuttle Imaging Radar Project, Ocean Science Experiment Rep., JPL	1983 - 1995
Member Technical Staff, JPL	1978 - present

Research Interests

•Investigations into the state of polar sea ice to identify possible changes due to climate change, through derivation of geophysical measurements using microwave remote sensing.
•Coastal oceanography circulation and its effects on biological productivity and pollutants using multi-sensor remote sensing.
•Development of radar instrumentation to measure sea ice thickness from airborne and spaceborne platforms.

Recent Projects

•NASA Instrument Incubator project: *Cryospheric Advanced Sensor: A Spaceborne Microwave Sensor of Sea Ice Thickness and Snow Cover Characteristics*. Responsibilities: Development of science requirements and strategies and experiment planning and analysis.

•Caltech Presidents Fund: *A Radar Sounder for Measuring Sea Ice Thickness -A Feasibility Study*. Co-PI with P. Gogineni, U. Kansas, with field campaign in May 2003.

•*Southern California Coastal Ocean Observing System*. A consortium of local universities in So. California including JPL to develop a coastal observatory for So. California. Responsibilities: Value-added satellite data sets.

Professional Activities

Alaska Satellite Facility User Working Group, Chairman; ESA CryoSat Cal/Val Science Team; RADARSAT Geophysical Processor System Science Working Group; ESA Envisat Science Team; NASDA ALOS Science Team; Envisat Category-1 Review Panel; Technical committee for IGARSS'03, IGARSS'04, and 2004 Envisat Symposium; Scientific committee for 2006 ESA

SeaSAR Symposium and 2007 ESA Envisat Symposium; Member, American Geophysical Union, and IEEE Geoscience and Remote Sensing Society.

Recent Publications

Martin, S., R. Drucker, R. Kwok, and B. Holt, Improvements in the estimates of ice thickness and production in the Chukchi Sea polynyas derived from AMSR-E, *Geophysical Research Letters*, 32, L05505, doi:10.1029/2004GL022013, 2005

Evans, D., W. Alpers, A. Cazenave C. Elachi, T. Farr, D. Glackin, B. Holt, L. Jones, W. T. Liu, W. McCandless, Y. Menard, R. Moore, E. Njoku, Seasat-A 25 Year Legacy of Success, *Remote Sensing of the Environmen*t, 94, 384-404, 2005.

Holt, B., SAR imaging of the ocean surface, in C. R. Jackson and J. R. Apel (eds) *Synthetic Aperture Radar (SAR) Marine User's Manual*, NOAA NESDIS Office of Research and Applications, Washington DC, pp. 25-79, 2004.

Vachon, P. W., F. M. Monaldo, B. Holt, and S. Lehner, Ocean surface waves and spectra, in C. R. Jackson and J. R. Apel (eds) *Synthetic Aperture Radar (SAR) Marine User's Manual*, NOAA NESDIS Office of Research and Applications, Washington DC, pp. 139-169, 2004.

Martin, S., R. Drucker, R. Kwok, and B. Holt, Estimation of the thin ice thickness and heat flux from SSM/I data for the Chukchi Sea Alaskan coast polynya for 1990 – 2001, *J. Geophysical Res*., 109, C10012, doi:10.1029/2004JC002428, 2004.

DiGiacomo, P. M., L. Washburn, B. Holt, and B. H. Jones, Coastal pollution hazards in Southern California observed by SAR imagery: Stormwater plumes, wastewater plumes, and natural hydrocarbon seeps, *Marine Pollution Bulletin*, 49, 1013-1024, 2004.

Holt, B., and R. Kwok, Sea ice geophysical measurements from Seasat to the present, with an emphasis on ice motion: A brief review and a look ahead, Proceedings of the Second Workshop on Coastal and Marine Applications of SAR, *ESA Pub. SP-565*, pp. 199-210, 2004.

DiGiacomo, P. M., and B. Holt, Satellite observations of small coastal ocean eddies in the Southern California Bight, *J. Geophys. Res*., 106(C10), 22,521-22,544, 2001.

Holt, B., and S. Martin, The effect of a storm on the 1992 summer sea ice cover of the Beaufort, Chukchi, and East Siberian Seas, *J. Geophys. Res*., 106 (C1), 1017-1032, 2001.

Curriculum Vita

Burton H. Jones
Department of Biological Sciences
and Wrigley Institute for Environmental Studies
University of Southern California
Los Angeles, CA 90089-0371

Education:
B.S., Biological Engineering, Rose-Hulman Institute of Technology 1971
Ph.D., Zoology (Biological Oceanography), Duke University 1977

Positions:
Teaching Assistant, Duke University, 1971-72
Research Assistant, Duke University, 1972-77
Postdoctoral Fellow/Research Scientist, Bigelow Laboratory for Ocean Sciences, 1977-80
Research Associate, Department of Biological Sciences, USC, 1980-81
Research Assistant Professor, Department of Biological Sciences, USC, 1981-93
National Research Council Senior Fellow, NOAA Great Lakes Environmental Research Laboratory, Ann Arbor, MI, 1992-93
Research Associate Professor, Department of Biological Sciences, USC, 1993-present

Memberships:
American Geophysical Union
American Society of Limnology and Oceanography
The Oceanography Society

Recent or Pertinent Publications:

Jones, B.H., L.P. Atkinson, D. Blasco, K. H. Brink, and S. L. Smith. 1989. The asymmetric distribution of chlorophyll associated with a coastal upwelling center. Continental Shelf Research 8:1155-1170.

Jones, B. H., C. N. K. Mooers, M. Rienecker, T. Stanton, and L. Washburn. 1991. Chemical and biological structure of a cool filament observed off northern California in July 1986 (OPTOMA21). Journal of Geophysical Research 96:22,207-22,225.

Kadko, D., L. Washburn, and B. H. Jones. 1991. Evidence of subduction within cold filaments off the northern California Coastal Transition Zone. Journal of Geophysical Research 96:14909-14926.

Washburn, L., D. C. Kadko, B. H. Jones, T. Cowles, and T. Hayward. 1991. Water mass subduction in a coastal upwelling system. Journal of Geophysical Research 96:14297-14946.

Carr, M.E., N.S. Oakey, B.H. Jones, and M.R. Lewis. 1992. Hydrographic patterns and vertical mixing in the equatorial Pacific along 150. Journal of Geophysical Research 97:611-626.

Jones, B.H., T.D. Dickey, L. Washburn, and D. Manov. 1993. Physical and biological dynamics of sewage outfall plumes in the coastal region: an integrated observational approach. In: Water Pollution II: Modeling, Measuring and Prediction, L.C. Wrobel and C.A. Brebbia (eds.), Computational Mechanics Publications, Southampton, pp. 527-534.

Carr, M.E., M.R. Lewis, D. Kelley, and B. Jones. 1995. A physical estimate of new production in the equatorial Pacific along 150°W. Limnology and Oceanography 40:138-147.

Petrenko, A.A., B.H. Jones, T.D. Dickey, M. LeHaitre, and C. Moore. 1997. Characterization of particle fields in Mamala Bay, HI with special emphasis on the Sand Island sewage plume. Journal of Geophysical Research 102(C11):25061-25071..

Washburn, L., B. M. Emery, B. H. Jones, and D. G. Ondercin, Eddy stirring and phytoplankton patchiness in the subarctic North Atlantic in late summer, Deep Sea Research Part I : Oceanographic Research (45)9 (1998) pp. 1411-1439.

Lee, C., B. H. Jones, K. H. Brink, and A. S. Fischer, The upper-ocean response to monsoonal forcing in the Arabian Sea: seasonal and spatial variability, Deep Sea Research Part II: Topical Studies In Oceanography (47)7-8 (2000) pp. 1177-1226.

Toon, R.K., S. E. Lohrenz, C. E. Rathbun, A. M. Wood, R. A. Arnone, B. H. Jones, J. C. Kindle, and A. D. Weidemann, Photosynthesis--irradiance parameters and community structure associated with coastal filaments and adjacent waters in the northern Arabian Sea, Deep Sea Research Part Ii: Topical Studies In Oceanography (47)7-8 (2000) pp. 1249-1277.

Wiggert, J.D., B.H. Jones, T.D. Dickey, K.H. Brink, R.A. Weller, J. Marra, L.A. Codispoti, The Northeast Monsoon's impact on mixing, phytoplankton biomass and nutrient cycling in the Arabian Sea, Deep Sea Research Part II: Topical Studies In Oceanography (47)7-8 (2000) pp. 1353-1385.

Svejkovsky, J., and B. Jones. 2001. Detection of Coastal Urban Stormwater and Sewage Runoff with Synthetic Aperture Radar Satellite Imagery. EOS 82(50):621-630.

Jones, B.H., M. Noble, and T.D. Dickey. 2002. Hydrographic and Particle Distributions over the Palos Verdes Continental Shelf: Spatial, Seasonal and Tidal Variability. Continental Shelf Research 22(6-7):945-965.

Grant, S.B, B.F. Sanders, J.A. Redman, J.H. Kim, R. Mrse, C.McGee, N.Gardiner, B.H. Jones, J. Svejkovsky, V. Leipzig, A. Brown (2001) "Generation of enterococci bacteria in a coastal salt water marsh and its impact on surf zone water quality", Environmental Science and Technology, 35:2407-2415.

Washburn, L., K. A. McClure, B. H. Jones, and S. M. Bay (2003) Spatial Scales and Evolution of Stormwater Plumes in Santa Monica Bay. Marine Environmental Research 56:103–125

DiGiacomo, P., L. Washburn, B. Holt, and B. H. Jones. 2004. Coastal pollution hazards in Southern California observed by SAR imagery: Stormwater plumes, wastewater plumes, and natural hydrocarbon seeps. Marine Pollution Bulletin 49:1013–1024.

Bogucki, D. J., B. H. Jones, and M.-E. Carr, 2004. Remote measurements of horizontal eddy diffusivity in Avalon Harbor. Journal of Atmospheric and Oceanic Technology **22:** 1373-1380.

Lee, C. et al., 2005. Notherna Adriatic Response to a Wintertime Bora Wind Event. *EOS* 86(16):157-168.

Grant, S. B., J. H. Kim, B. H. Jones, S. A. Jenkins, and J. Wasyl. 2005. Surf zone entrainment, long-shore transport, and human health hmplications of fecal pollution from tidal outlets, *Journal of Geophysical Research*, 110(C10):025

Ashjian, C, R. Arnone, C. Davis[1], B. Jones, M. Kahru, C. Lee, and B. G. Mitchell. 2006. Bioloical structure and seasonality in the Japan-East Sea. *Oceanography*.19(3):122-133.

Rosenfeld, L. K., McGee, C. D., Robertson, G. L., Noble, M. A., Jones, B. H. 2006. Temporal and spatial variability of fecal indicator bacteria in the surf zone off Huntington Beach, CA. *Marine Environmental Research* 61:471-493

Schnetzer, A. and others 2006. Blooms of Pseudo-nitzschia and domoic acid in the San PedroChannel and Los Angeles Harbor areas of the Southern California Bight, 2003-2004. *Harmful Algae* In revision.

JOHN A. MCGOWAN
Curriculum Vita

CITIZENSHIP: U.S.A.

EDUCATION: B.S., Oregon State College
M.S., Oregon State College
Ph.D., University of California, San Diego,
Scripps Institution of Oceanography

CURRENT POSITION: Research Professor of Oceanography, Integrative Oceanography Division, Scripps Institution of Oceanography, University of California, San Diego

RESEARCH INTERESTS:
1. Multiple stable states in the community of the North and South Pacific central water masses
2. Large scale patterns in space and time and the Californian El Niños
3. Diversity maintenance
4. Biogeography
5. Time series in coastal California
6. Climate and pelagic ecology

MEMBERSHIPS:
American Association for the Advancement of Science
Marine Biological Association of the United Kingdom
American Society of Limnology and Oceanography

PROFESSIONAL ACTIVITIES:
National and International Committees:
International Oceanographic Commission Committee on Ocean Assessment (current)
Office of Naval Research
NOAA
National Science Foundation committees
Manuscript referee for *Nature, Science, Limnology and Oceanography.*
Book reviews for *Science.*

INVITED LECTURES:
Woods Hole Oceanographic Institution
University of Wisconsin
University of Rhode Island

University of California, Berkeley
University of California, Santa Cruz
University of California, Davis
Challenger Soc. London
NATO Int. School of Marine Biology

Chief Scientist on 12 ocean going expeditions.

SELECTED PUBLICATIONS:

2003 The biological response to the 1977 regime shift in the California Current. Deep-Sea Research, Part II. pp 2567-2582. With S. J. Bograd, R. J. Lynn and A. J. Miller

2002 Ocean Science, In Oceans 2020:Science,Trends,and the Challenge of Sustainability. The Intergovernmental Oceanographic Commission. UNESCO, Island Press pp 9-45

1998. Climate-Ocean variability and ecosystem response in the northeast Pacific. *Science*, vol. 281, pp 210-217. With Daniel R. Cayan and LeRoy Dorman.

1996 Plankton patterns, climate and change in the California current. CalCOFI Rep. Vol37, pp 45-68. with D. B. Chelton and A. Conversi.

1995. Climatic warming and the decline of zooplankton in the California current. *Science*, vol. 267, pp 1324-1326. With Dean Roemmich.

1995. Temporal change in marine ecosystems. In *Natural climate variability on decade to century time scales*. Eds. D.G. Martinson, et al: National Academy Press, pp 555-71.

1993. Pelagic diversity patterns. In *Species Diversity in Ecological Communities: Historical and Geographical Perspectives*, R.E. Ricklefs and D. Schluter, Eds., University of Chicago Press, Chicago.

1990. Species dominance-diversity patterns in oceanic communities. In *The Earth in Transition*. George M. Woodwell, Ed., Cambridge University Press, New York. pp 395-421.

1989. Pelagic ecology and Pacific climate. *American ysical Union Monograph*, 55: 141-150.

BIOGRAPHICAL SKETCH

NAME: Brian Gregory Mitchell

ADDRESS:
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A. PROFESSIONAL PREPARATION:
University of Texas at Austin, Aquatic Biology with honors, 1977 B.S. Special Honors in Botany
University of Southern California, Biology (Biological Oceanography), 1987 Ph.D.
University of California San Diego, Scripps Institution of Oceanography, Postgraduate Researcher 1987-1988

B. APPOINTMENTS:
2000-Present Research Biologist, UC San Diego, Scripps Institution of Oceanography
1994-2000 Associate Research Biologist, UC San Diego, Scripps Institution of Oceanography
1990-1992 Program Scientist Ocean Biogeochemistry Program, NASA Headquarters, Washington, D. C.; Program Scientist SeaWiFS
1988-1994 Assistant Research Biologist, UC San Diego, Scripps Institution of Oceanography
1987-1988 Postgraduate researcher UC San Diego Scripps Institution of Oceanography
1986-1987 Bio-optical oceanographic consultant, Biospherical Instruments, Inc.
1985-1987 Staff Research Associate, University of California San Diego, Scripps Institution of Oceanography

C. 5 MOST RELEVANT PUBLICATIONS

Hewes, C.D., Mitchell, B.G., Moisan, T.A., Vernet, M., Reid, F.M.H. (1998) The phycobilin signatures of chloroplasts from three dinoflagellate species: a microanalytical study of *dinophysis caudata, D. fortii* and *D. acuminata* (Dinophysiales, Dinophyceae). *Journal of Phycology.* **34**: 945-951

Kahru, M., and B.G. Mitchell. (2002) Influence of the El Niño – La Niña cycle on satellite-derived primary production in the California Current. *Geophys. Res. Let*., 29(9), doi: 10.1029/2002GL014963.

Kahru, M. and B.G. Mitchell (1998) Spectral reflectance and absorption of a massive red tide off Southern California. *J.Geophys.Res.,* **103**, 21,601-21,609

Mitchell, B.G. and D.A. Kiefer (1988), Chlorophyll a specific absorption and fluorescence excitation spectra for light-limited phytoplankton. *Deep-Sea Research*, **35**: 639-663.

Mitchell,B.G. and Kiefer,D.A. (1988) Variability in pigment specific particulate fluorescence and absorption spectra in the northeastern Pacific Ocean. *Deep-Sea ReearchI* **35**, 665-689.

5 OTHER PUBLICATIONS

Kahru, M., and B.G. Mitchell (2001). Seasonal and non-seasonal variability of satellite-derived chlorophyll and CDOM concentration in the California Current. *J. Geophys. Res.*, 106(C2): 2517-2529, 2001.

Moisan, T.A. and B.G. Mitchell, 1999. Photophysiological adaptation of *Phaeocystis antarctica* Karsten under PAR Light Limitation. *Limnol.Oceanogr.* **44(2):** 247-258

Moisan, T.A., M. Olaizola and B.G. Mitchell, 1998. Xanthophyll cycling in *Phaeocystis antarctica* Karsten: Changes in cellular fluorescence. *Marine Ecology Progress Series* **169:**113-121

Sosik, H.M. and B.G. Mitchell (1994) The effects of temperature on growth and light absorption in *Dunalliela tertiolecta* (chlorophyceae) *Journal of Phycology*, **30**: 833-840.

Stramski, D. R.A. Reynolds, M. Kahru & B.G. Mitchell, 1999. Estimation of particulate organic carbon in the Ocean from satellite remote sensing. *Science*, **285:** 239-242.

D. SYNERGISTIC ACTIVITIES:

- Board memberships include Ocean Studies Board, National Research Council (1996-1999); Board of Directors Houston Advanced Research Center; Sigma Xi International Committee
- Advisor, Scripps Undergraduate Research Fellows (1995, 1997, 1998, 2000) summer program for underrepresented minorities. Advisor for Ocean Sciences poster presented by Omar Guerra
- Co-author of article on NASA SeaWiFS chlorophyll a standard product algorithm; contributor to NASA SIMBIOS ocean optics and JGOFS Southern Ocean data bases
- International collaborations include Committee member for CICESE PhD student Ramon Sosa Avalos; Postdoctoral advisor for Mexico CONACYT fellow Alma Giles-Guzman; Member NASDA (Japan) ocean color science teams (OCTS and GLL); Principal Investigator for NASDA GLI chlorophyll, K490 and CDOM standard products
- Oceanographic lectures in coordination with KPBS "Reach Out" in local middle schools

E. COLLABORATORS AND OTHER AFFILIATIONS:

i. Collaborators: Dale Kiefer, Maria Vernet, Osmund Holm-Hansen, Dariusz Stramski, Charles McClain, Thomas Hayward, Lynne Talley, Burton Jones, Dan Lubin, Rick Reynolds, Alexander Vassilkov, Jay Herman, Ken Smith.

ii. Graduate and Post Doctoral Advisors:

Graduate Advisor: Dale A. Kiefer, University of Southern California
Post-doc Advisor: Osmund Holm-Hansen, Scripps Institution of Oceanography

iii. Thesis Advisor and Postgraduate-Scholar Sponsor:

Graduate Advisee: Heidi M. Sosik (WHOI), Tiffany Moisan (NASA), Xi Chen (Motorola) Jessica Nolan (York College), Elizabeth Frame (University of Washington)
Post-Graduate Sponsor: Rick A. Reynolds (University of Washington); Alma Giles –Guzman (CICESE); Haili Wang (in residence)
Total Number of Graduate Students Advised: 4 completed Ph.D., 1 completed MS,
Total Number of Post Doctoral Scholars Sponsored: 2 completed, 1 in progress

CURRICULUM VITA

Mark Alan Moline
Biological Sciences Department and
Center for Coastal Marine Sciences
California Polytechnic State University
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PROFESSIONAL PREPARATION

1991-1996 Ph.D. Biology, University of California, Santa Barbara
1982-1987 B.A. Biology, St. Olaf College

PROFESSIONAL APPOINTMENTS

2004-pres. Director, Center for Coastal Marine Science
2002-pres. Associate Professor, California Polytechnic State University
1998-2002. Assistant Professor, California Polytechnic State University
1996-1997 Postdoctoral Associate, Rutgers University

AWARDS, HONORS and CERTIFICATIONS

Editors' Citation, American Geophysical Union (2005), UNOCAL Endowed Professor of Marine Science (2005), Invited Scientist National Academy of Sciences Frontiers of Science Symposium (2002), National Research Distinction Award, Cal Poly State University (2002), 2002 UNOCAL Endowed Professor of Marine Science (2002), Presidential Early Career Award for Scientists and Engineers, NASA (2002), Young Investigator Award, ONR (2000), New Investigator Program Award, NASA (1999), Invited Scientist DIALOG II Symposium (1997), Graduate Division's Dissertation Fellowship, UCSB (1995), University of California Research Diver Certificate (1992), Departmental Distinction, Biology, St. Olaf College (1987), Antarctic Service Medal, National Science Foundation (1986), National Sea Grant Fellow, U of Maryland (1985)

SELECTED RELEVANT PUBLICATIONS (12 OF 65)

Moline, M.A., D.L. Woodruff and N.R. Evans. Optical Delineation of Benthic Habitat Using an Autonomous Underwater Vehicle. J. Field Robotics (in press).

Robbins, I.C., G.J. Kirkpatrick, S.M. Blackwell, J. Hillier, C.A. Knight and **M. A. Moline**. 2006. Improved monitoring of HABs using autonomous underwater vehicles (AUV). Harmful Algae, doi:10.1016/j.hal.2006.03.005.

Moline, M. A., Blackwell, S. M., Allen, B., Austin, T., Forrester, N., Goldsborogh, R., Purcell, M., Stokey, R. and C. von Alt. 2005 Remote Environmental Monitoring UnitS: An Autonomous Vehicle for Characterizing Coastal Environments. J. Atmos. Oceanic. Technol., 22 (11): 1798–1809.

Shulman, I., D. J. McGillicuddy Jr., **M.A. Moline**, S. H. D. Haddock, J.C. Kindle, D. Nechaev and M.W. 2005. Bioluminescence Intensity Modeling and Sampling Strategy Optimization. J. Atmos. Oceanic. Technol., 22 (9): 1267–1281.

Moline, M.A., P. Bissett, S. Blackwell, J. Meuller, J. Sevadjian , C. Trees and R. Zaneveld. 2005. An autonomous vehicle approach for quantifying

bioluminescence in ports and habors. In: Photonics for Ports and Harbors, M. J. DeWeert, Ed., SPIE, Bellingham, WA, 81-87.

Moline, M. A., S. M. Blackwell, R. Chant, M. J. Oliver, T. Bergmann, S. Glenn and O. M. E. Schofield. 2004. Episodic physical forcing and the structure of phytoplankton communities in the coastal waters of New Jersey. J. Geophys. Res., Vol. 109, C12S05 doi: 10.1029/2003JC001985

Moline, M. A., H. Claustré, T. Frazer, O. Schofield and M. Vernet. 2004. Alteration of the food web along the Antarctic Peninsula in response to a regional warming trend. Global Change Biology 10, 1973–1980, doi: 10.1111/j.1365-2486.2004.00825.x.

Oliver, M., J. Kohut, A. Irwin, O. Schofield. S. Glenn, **M. A. Moline**, and W.P. Bissett 2004. Bioinformatic approaches for objective detection of water masses. Journal Geophysical Research – NEOS Special Section. Vol 109 C07S04 doi: 10.1029/2003JC002072.

Moline, M. A., O. Schofield and J. Grzymski. 2001. Impact of dynamic light and nutrient environments on phytoplankton communities in the coastal ocean. In: (M. Ruth and J. Lindholm eds.) Dynamic Modeling for Marine Conservation. Springer-Verlag, Amsterdam., pp. 144-163.

Kirkpatrick, G. J., D. F. Millie, **M. A. Moline**, and O. Schofield. 2000. Optical discrimination of a phytoplankton species in natural mixed populations. Limnol Oceanogr 45(2): 467-471.

Moline, M. A. 1998. Photoadaptive response during the development of a coastal Antarctic diatom bloom and relationship to water column stability. Limnol Oceanogr 43: 114-127

Claustre, H., **M. A. Moline** and B. B. Prézelin. 1997. Sources of variability in the column photosynthetic cross section for Antarctic coastal waters. Journal of Geophysical Research. 102(C11): 25,047-25,060.

J. CARTER OHLMANN
Institute for Computational Earth System Science
University of California
Santa Barbara, CA 93106-3060
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Education:

Ph.D., University of California, Santa Barbara, Oceanography, 1997
M.S., University of California, Santa Barbara, Mechanical Engineering, 1995
M.S., California Polytechnic University, San Luis Obispo, Architecture, 1991
B.A., University of California, San Diego, Applied Math, 1986

Positions Held:

2005 – present	Associate Research Oceanographer, Institute for Computational Earth System Science, University of California, Santa Barbara
2003 – 2006	Visiting Research Oceanographer, Physical Oceanography Research Division, Scripps Institution of Oceanography, La Jolla, CA
2000 – 2005	Assistant Research Oceanographer, Institute for Computational Earth System Science, University of California, Santa Barbara
1998 – 2000	Postdoctoral Researcher, Physical Oceanography Research Division, Scripps Institution of Oceanography, La Jolla, CA
1997 – 1998	Postdoctoral Researcher, ICESS, University of California, Santa Barbara
1992 – 1997	Research Assistant, ICESS, University of California, Santa Barbara

Publications related to the proposed work:

Ohlmann, J. C., and P. P. Niiler, A two-dimensional response to a tropical storm on the Gulf of Mexico shelf, *Journal of Marine Systems*, **29**, 87-99, 2001.

Ohlmann, J. C., P. P. Niiler, C. A. Fox, and R. R. Leben, Eddy energy and shelf interactions in the Gulf of Mexico, *Journal of Geophysical Research*, **106**, 2605-2620, 2001.

LaCasce, J. H., and J. C. Ohlmann, Relative dispersion at the surface of the Gulf of Mexico, *Journal of Marine Research,* **61,** 285-312, 2003.

Ohlmann, J. C., and P. P. Niiler, Circulation over the continental shelf in the northern Gulf of Mexico, *Progress in Oceanography*, **64**, 45-81, 2005.

Ohlmann, J. C., P. F White, A. L. Sybrandy, and P. P. Niiler, GPS-cellular drifter technology for coastal ocean observing systems, *Journal of Atmospheric and Oceanic Technology*, **22**, 1381-1388, 2005.

Publications (select other):

Ohlmann, J. C., D. A. Siegel, and L. Washburn, Radiant heating of the western equatorial Pacific during TOGA-COARE, *Journal of Geophysical Research*, **103**, 5379 – 5395, 1998.

Ohlmann, J. C., D. A. Siegel, and C. D. Mobley, Ocean radiant heating: 1. Optical influences, *Journal of Physical Oceanography*, **30**, 1833-1848, 2000.

Ohlmann, J. C., and D. A. Siegel, Ocean radiant heating: 2. Parameterizing solar radiation transmission through the upper ocean, *Journal of Physical Oceanography*, **30**, 1849-1865, 2000.

Ohlmann, J. C., Ocean radiant heating in climate models, *Journal of Climate*, **16***,* 1337-1351, 2003.

Ohlmann, J. C., P. F White, L. Washburn, E. Terrill, B. Emery, and M. Otero, Interpretation of coastal HF radar derived surface currents with high resolution drifter data, *Journal of Atmospheric and Oceanic Technology*, in press.

Synergistic Activities:
Participant in the NOAA teacher-at-sea program (R/V Ron Brown; 2002).
Worked with Andy Sybrandy (Pacific Gyre Corp.) on oceanographic instrument development.
Helped implement the Ohlmann (2003) radiant heating model in the NCAR/CCM.
NSF Physical Oceanography proposal review panel (2005)

Collaborators:

Meghan Cronin (PMEL)
Chris Fairall (NOAA/ETL)
Mike Gregg (UW)
Joe Lacasce (WHOI)
Robert Leben (CU)
Arthur Miller (SIO)
Curt Mobley (SS)
Peter Niiler (SIO)
Clayton Paulson (OSU)
Dave Siegel (UCSB)
Andy Sybrandy (PG)
Bob Weller (WHOI)
Gary Wick (NOAA/ETL)

Co-editors:
none in the last 24 months

Advisors:
David Siegel, University of California, Santa Barbara (graduate)
Peter Niiler, Scripps Institution of Oceanography (postdoctoral)

John A. Orcutt
Associate Vice Chancellor for Research
University of California, San Diego
La Jolla, CA 92093-0210

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FAX (858) 822-3372
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Education

B.S.	1966	U.S. Naval Academy, Annapolis, MD
M.Sc.	1968	University of Liverpool, UK
Ph.D.	1976	University of California, San Diego

Research and/or Professional Experience

2006 - present	Associate Vice Chancellor – Research Affairs; Director, UCSD Center for Earth Observations & Applications
2002-2006	Deputy Director, Scripps
1984-present	Professor of Geophysics, Scripps Institution of Oceanography, UCSD
1984-2002	Director, Cecil H. & Ida M. Green Institute of Geophysics and Planetary Physics, UCSD
1982-1984	Associate Professor of Geophysics, Scripps Institution of Oceanography, UCSD
1980-1982	Associate Research Geophysicist, Scripps Institution of Oceanography, UCSD
1977-present	Visiting Associate in Geophysics, California Institute of Technology
1977-1980	Assistant Research Geophysicist, Scripps Institution of Oceanography, UCSD
1976-1977	Postgraduate Research Geophysicist, Scripps Inst. of Oceanography, UCSD
1967-1973	Chief Engineer, the nuclear submarine USS Kamehameha, U.S. Navy

Honors and Awards

Trident Scholar, U.S. Naval Academy	1965-1966
Graduate, 3rd in Class, U.S. Naval Academy	1966
Summer College Intern Program, U.S. Dept. of State	1966
Fulbright Scholar, United Kingdom	1966
Woods Hole Visiting Scholar	1980
Newcomb-Cleveland Prize from American Assoc. for Advancement of Science	1980
Fellow, American Geophysical Union	1989
Maurice Ewing Medal, American Geophysical Union	1994
Secretary of the Navy/Chief of Naval Operations Oceanography Chair	1996-2002
Member, American Philosophical Society	2002-
President, American Geophysical Union	2004-2006
Past-President, American Geophysical Union	2006-2008

Research Interests

Applications of information technology to integrating global observations
Ocean bottom seismology and the structure of mid-ocean ridges & hotspots
Wireless networking and real-time data management
Global and crustal seismic tomography

Relevant Publications

Suyehiro, K., J.-P. Montagner, R.A. Stephen, E. Araki, T., Kanazawa, J. Orcutt, B. Romanowicz, S.Sacks, and M. Shinohara (2006), "Ocean Seismic Observatories.", Oceanography **19**(4),
Taesombut, N., F. Uyeda, AA. Chien, L. Smarr, T. DeFanti, P. Papadopoulos, J. Leigh, M.

Ellisman, and J. Orcutt (2006), "The OptIPuter: High-Performance, Q0S-Guaranteed Network Service for Emerging E-Science Applications." IEEE Communications Magazine **44**(5), 38-45, 10.1109/MCOM.2006.1637945.
Berger, J., J.A. Orcutt, and F. Vernon (2005). "HighSeasNet: Providing Internet to the UNOLS fleet: A model for real-time Internet data collection from the ORION platforms." Sea Technology **46**(6), 17-20.
Sutherland, F.H., F.L. Vernon, and J.A. Orcutt (2004). "Results from OSNPE: Improved teleseismic earthquake detection at the seafloor." Bull. Seismological Soc. of Am. **94**(5) 1868.
Orcutt, J. (2003) "The Ocean Research Interactive Observatory Networks (ORION) program." EOS Trans AGU **46**(40), 44, 10.1029/2003EO400005.
Sutherland, F.H., F.L. Vernon, and J.A. Orcutt (2004). "Results from OSNPE: Improved teleseismic earthquake detection at the seafloor." Bull. Seismological Soc. of Am. **94**(5) 1868-1878.

Five Other Significant Publications

Orcutt, J. (2005) "Global scale sensor networks – opportunities and challenges" Information Processing in Sensor Networks. 434, 10.1109/IPSN.2005.1440965.
Blackman, D.K., C. de Groot-Hedlin, P. Harben, A. Sauter, and J. Orcutt, (2004). "Testing low/very low frequency acoustic sources for basin-wide propagation in the Indian Ocean." Jour. Acoustical Soc. Am. **116**(4), 2057-2066, 10.1121/1.1786711.
Stephen, R.A., F N. Spiess, J.A. Collins, J.A. Hildebrand, J.A. Orcutt, K.R. Peal, F.L. Vernon, and F.B. Wooding (2003). "Ocean seismic network pilot experiment." Geochemistry Geophysics Geosystems **4**(910), 1092, 10.1029/2002GC000485,2003.
Sandwell, D.T., S. Gille, and J. Orcutt (2003). "Bathymetry from space is now possible." EOS **84**(5), 37, 44.
Newman, H.H., M.H. Ellisman, and J.A. Orcutt (2003), "Data-intensive e-science frontier research." Communications of the ACM, **46**(11), 68-77.

Synergistic Activities (Last 12 Months)

Member, Ocean Research Integrated Observatories Networks Executive Steering Committee (2004-present)
Member, Board of Governors, Joint Oceanographic Inst, Inc (1984 – present)
Member, Board of Governors, Integrated Ocean Drilling Program (2002-present)
Member, JOI/CORE Ocean Council (2005-present)
Member, Board of Governors, Consortium for Ocean Research & Ed (2004-present)

Recent Collaborators:

A. Baggeroer (MIT), D.K. Blackman (SIO), A. Chave (WHOIC. Collins (NPS), J. Collins (SIO), C. deGroot-Hedlin (SIO), R. Detrick (WHOI), A.J. Harding (Scripps), M.A.H. Hedlin (SIO),G.M. Kent (SIO), S. Singh (IPGP-Paris), M. Sinha (Southampton), S. Solomon (DTM/CIW), S. R. Stephen (WHOI), S. Webb (SIO), C. Wolfe (DTM./NSF), J. Mutter (LDEO), F.L. Vernon (SIO), T. Wallace (UA), Arcot Rajasekar (UCSD/SDSC)

PhD Thesis Advisors: LeRoy Dorman, Freeman Gilbert (Scripps)

Graduate Students Supervised (Last 5 Years):

Fiona Sutherland, Sara Bazin, Renee Bulow

CURRICULUM VITAE

NAME: Cheryl L. Peach

ADDRESS: Scripps Institution of Oceanography, University of California San Diego, 9500 Gilman Drive, 0207, La Jolla, CA 92093-0207
Tel: (858) 822-5323 FAX: (858) 534-7114 email: cpeach@ucsd.edu

A. EDUCATION:

1993	Ph.D. - Geological Sciences - Columbia University, New York, NY
1987	M.S. - Oceanography - College of Ocean and Fisheries Sciences University of Washington, Seattle, WA
1982	B.A. - Environmental Sciences - University of Virginia, Charlottesville, VA

B. EXPERIENCE:

2001- present	Science Academic Coordinator: Scripps Institution of Oceanography, Birch Aquarium, La Jolla, CA. Coordinator of academic programs linking SIO research with K-12 education and outreach. SIO Director of California Center for Ocean Science Education Excellence
2001- present	Adjunct Faculty Member: Sea Education Association, Woods Hole, MA
2000- 2001	Interim Dean: Sea Education Association, Woods Hole, MA. Coordinator of all academic programs at the Sea Education Association, including budget preparation and staff supervision
1994-2000	Oceanography Faculty: Sea Education Association, Woods Hole, MA. Responsible for teaching *SEA Semester*, a junior-level course in Oceanography and Oceanographic field research, and SEA seminar courses for teachers and high school students
1997	Interim Dean: Sea Education Association, Woods Hole, MA
1994	Lecturer in Oceanography: Fairleigh-Dickinson University, Teaneck, NJ.
1992-1994	Assistant Scientist: Department of Earth and Planetary Sciences, American Museum of Natural History, New York, NY. Conducted independent research on the geochemistry of platinum-group elements in mafic and ultramafic igneous rocks
1987-1992	Graduate Research and Teaching Assistant: Lamont-Doherty Geological Observatory, Palisades, NY; Columbia University Faculty Fellow
1990	Instructor: St. Thomas Aquinas College, Orangeburg, NY. Designed and taught a High School summer program for math and the sciences
1989	Teaching Assistant, Department of Earth and Planetary Sciences, American Museum of Natural History, New York, NY. Instructed teaching staff at the museum in basic Earth Sciences
1984-1988	Graduate Research Assistant: Los Alamos National Laboratory, Los Alamos, NM. Summer appointments for thesis research and work on the Nuclear Waste Disposal Project
1984-1987	Graduate Research and Teaching Assistant: College of Ocean and Fisheries Sciences, University of Washington, WA
1981	Research Assistant: U.S. Army Corps of Engineers Coastal

Engineering Research Facility, Duck, NC

C. PUBLICATIONS:

Shankland T.J., Duba A.G., Mathez E.A. and Peach C.L. (1997) Increase in electrical conductivity with pressure as an indicator of conduction through a solid phase in midcrustal rocks. *Jour. Geophys. Res.* **102, B7**, 14,741-14,750.

Peach C.L. and Mathez E.A. (1996) Constraints on the formation of platinum-group element deposits in igneous rocks. *Econ. Geol.* **91**, 439-450.

Peach C.L., Mathez E.A., Keays R.R. and Reeves S.J. (1994) Experimentally determined sulfide melt--silicate melt partition coefficients for iridium and palladium. *Chem. Geol.* **117**, 361-377.

Nilsson K. and Peach C.L. (1993) Sulfur speciation as a function of magmatic oxidation state: Implications for sulfur concentrations in arc and backarc lavas. *Geochim. Cosmochim. Acta.* **57**, 3807-3813.

Peach C.L. and Mathez E.A. (1993) Sulfide melt-silicate melt distribution coefficients for nickel and iron and implications for the distribution of other chalcophile elements. *Geochim. Cosmochim. Acta.* **57**, 3013-3021.

D. SYNERGISTIC ACTIVITIES:

Cheryl's career has been focused on instilling in students the "scientific habits of mind" that come from direct participation in the research process. In September 2001 she assumed the position Academic Coordinator at the Birch Aquarium at Scripps Institution of Oceanography. Her major responsibilities at SIO include supporting the interplay between science and education by spearheading new initiatives in outreach and education, as well as incorporating aspects of SIO research activities into existing programs. She is currently the SIO Director for the California Center for Ocean Science Education Excellence and serves Education and Diversity representative on the NSF Geoscience Directorate Advisory Committee. Prior to her arrival at SIO, Cheryl spent 7 years as an Oceanography Faculty member and Interim Dean at SEA (Sea Education Association), a private non-profit organization dedicated to undergraduate education in ocean sciences. As an SEA faculty member Cheryl served as a seagoing research scientist and taught college undergraduates both on shore and at sea. She has had additional experience teaching science to high school students in SEA's *Science at Sea Program* and the Education Department at the American Museum of Natural History. More recently, Dr. Peach has dedicated herself to teacher professional development, serving as oceanography instructor and chief scientist for SEA's K-12 teacher programs. Cheryl was P.I., oceanography instructor and chief scientist for *Research at SEA*, a 5-year, National Science Foundation, teacher professional development program for middle and high school science teachers. The *RAS* program focused both on providing a research experience for teachers and bringing inquiry-based learning into the classroom. As Interim Dean at SEA in both 1997 and 2000-2001, Cheryl assumed an administrative position that involved interacting with students, parents and employees, providing academic guidance to the faculty and developing new programs. In her new position at the Birch Aquarium Cheryl will be instrumental in forging links between SIO researchers and the outreach and education community.

E. COLLABORATORS AND OTHER AFFILIATIONS

Roberta Dean, MARE, Lawrence Hall of Science, UCB, Berkeley, CA
Sharon Roth-Franks, no current affiliation
Audrey Meyer, Falmouth Academy, Falmouth, MA
Russ Moll, California Sea Grant, La Jolla, CA
Craig Strang, MARE, Lawrence Hall of Science, UCB, Berkeley, CA
Deidre Sullivan, MATE, Monterey Peninsula College, Monterey, CA
Edmond Mathez. Ameriacn Museum of Natural History, New York, NY
David Walker, Lamont-Doherty Earth Observatory, Palisades, NY

Curriculum Vita

NAME: Daniel L. Rudnick

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Phone: 858-534-7669

PROFESSIONAL PREPARATION
University of California, San Diego, Physics, B.A. Cum Laude, 1981
Scripps Institution of Oceanography, UCSD, Oceanography, Ph.D., 1987
Woods Hole Oceanographic Institution, Postdoc, 1987-1989

APPOINTMENTS

2001- Professor
Scripps Institution of Oceanography
University of California, San Diego

1997-2001 Associate Professor
Scripps Institution of Oceanography
University of California, San Diego

1993 - 1997 Assistant Professor
Scripps Institution of Oceanography
University of California, San Diego

1989 - 1993 Assistant Professor
School of Oceanography
University of Washington

FIVE RELATED PUBLICATIONS

Rudnick, D. L. and R. E. Davis, 1988: Mass and heat budgets on the northern California continental shelf. *J. Geophys. Res.*, **93,** 14013-14024.

Rudnick, D. L., and R. Ferrari, 1999: Compensation of horizontal temperature and salinity gradients in the ocean mixed layer. *Science,* **283,** 526-529.

Rudnick, D. L. and J. P. Martin, 2002: On the horizontal density ratio in the upper ocean. *Dyn. Atmos. Oceans*, **36,** 3-21.

Rudnick, D. L., R. E. Davis, C. C. Eriksen, D. M. Fratantoni, and M. J. Perry, 2004: Underwater gliders for ocean research. *Mar. Tech. Soc. J.*, **38,** 73-84.

Hodges, B. A. and D. L. Rudnick, 2006: Horizontal variability in chlorophyll fluorescence and potential temperature. *Deep-Sea Res. I*, **53**, 1460-1482.

FIVE OTHER PUBLICATIONS

Rudnick, D. L., 1996: Intensive surveys of the Azores Front, 2 Inferring the geostrophic and vertical velocity fields. *J. Geophys. Res.,* **101,** 16,291-16,303.

Rudnick, D. L., 2001: On the skewness of vorticity in the upper ocean. *Geophys. Res. Lett.,* **28,** 2045-2048.

Rudnick, D. L. and R. E. Davis, 2003: Red noise and regime shifts. *Deep-Sea Res. I*, **50,** 691-699.

Rudnick, D. L., T. J. Boyd, R. E. Brainard, G. S. Carter, G. D. Egbert, M. C. Gregg, P. E. Holloway, J. M. Klymak, E. Kunze, C. M. Lee, M. D. Levine, D. S. Luther, J. P. Martin, M. A. Merrifield, J. N. Moum, J. D. Nash, R. Pinkel, L. Rainville, and T. B. Sanford, 2003: From tides to mixing along the Hawaiian Ridge. *Science*, **301,** 355-357.

Rudnick, D. L. and W. Munk, 2006: Scattering from the mixed layer base into the sound shadow. *J. Acoust. Soc. Am.*, **120**, 2580-2594.

SYNERGISTIC ACTIVITIES

Instrument development activities include: the establishment of a SeaSoar facility at SIO, and its transfer to Shipboard Technical Services to allow broader community access; and the development of an Underway CTD to collect profiles of temperature, salinity, and pressure from ships at speeds up to 20 knots. Service includes: membership on the CLIVAR Pacific Implementation Panel; Associate Editor of Journal of Atmospheric and Oceanic Technology; Co-Chair of the Autonomous and Lagrangian Platforms and Sensors (ALPS) organizing committee.

ADVISORS

Graduate advisor: Russ E. Davis (SIO)
Postdoctoral advisor: Robert A. Weller (WHOI)

GRADUATE STUDENTS ADVISED

Wendi Eastman, M.S. 1996
Raffaele Ferrari, Ph.D. 2000
Joseph Martin, Ph.D. 2004
Ben Hodges, Ph.D. 2006
Tim Converse, M.S. 2006
Sylvia Cole, current Ph.D. student
Robert Todd, current Ph.D. student

BIOGRAPHICAL SKETCH

NAME: Uwe Send

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Phone: 858-534-1876

PROFESSIONAL PREPARATION

University of Sussex, Astronomy, M.Sc., 1980
University of Southampton, Oceanography, M.Sc., 1982
Scripps Institution of Oceanography, UCSD, Oceanography, Ph.D., 1988
Universitaet Kiel, Institut fuer Meereskunde, Habilitation (German qualification for full professorship), 1995

APPOINTMENTS

2003-	Professor Scripps Institution of Oceanography, University of California, San Diego
1998-2003	Professor (tenured C3) Institut fuer Meereskunde Universitaet Kiel
1995-1998	Associate Professor (C2) Institut fuer Meereskunde Universitaet Kiel
1989-1995	Assistant Professor (C1) Institut fuer Meereskunde Universitaet Kiel

FIVE RELATED PUBLICATIONS

Send, U., F. Schott, F. Gaillard and Y. Desaubies, 1995: Oberservation of a deep convection regime with acoustic tomography. *J. Geophys. Res*. , **100** (C4), 6927-6941.

Send, U., C. Eden, and F. Schott, 2002: Atlantic Equatorial Deep Jets: Space/Time Structure and Cross-Equatorial Fluxes. *J. Phys. Oc*. **32** (3), 891-902.

Send, U., T. Kanzow, W. Zenk and M. Rhein, 2002: Monitoring the Atlantic Meridional Overturning Circulation at 16°N. *Exchanges*, **7** (3/4), 31-33.

Send, U, P. F. Worcester, B. D. Cornuelle, C. O. Tiemann, and B. Baschek, 2002: Integral measurements of mass transport and heat content in straits from acoustic transmissions. Deep-Sea Res., **49** (19), 4069-4096.

Macrander, A., R.H. Kaese, U. Send, H. Valdimarsson, and S. Jonsson, 2003: Dynamic Relations in the Denmark Strait Overflow verified by velocity and hydrographic observations. Submitted to *Ocean Dynamics*

FIVE OTHER PUBLICATIONS

Send, U. and J. Marshall, 1995: Integral effects of deep convection. *J. Phys. Oceanogr*., **25** (5), 855-872.

Send, U., G. Krahmann, D. Mauuary, Y. Desaubies, F. Gaillard, T. Terre, J. Papadakis, M. Taroudakis, E. Skarsoulis, and C. Millot, 1997: Acoustic observations of heat content across the Mediterranean Sea. *Nature*, **385**, 615-617.

Send, U., and R. Kaese, 1998: Parameterization of Processes in Deep Convection Regimes. In E.Chassignet and J.Verron (eds.): *Ocean Modelling and Parameterization*. Kluwer Academic Publishers, p.191-214.

Send, U., and B. Baschek, 2001: Intensive ship-board observations of the flow through the Strait of Gibraltar. *J. Geophys. Res*., **106** (C12), 31,018-31,032.

Schmidt, S., and U. Send, 2003: Timing, Origin and Composition of Seasonal Labrador Sea Freshwater. *Geophys. Res. Letters*, submitted.

SYNERGISTIC ACTIVITIES

- Session Convenor at various EGS assemblies and American Acoustical Society Conference
- Member, ARGO International Science Team and ARGO Data Management Team
- Member, Clivar Ocean Observation Panel
- Co-Chair, International Timeseries Science Team
- Development of a data telemetry system for moorings
- Initiation of a European collaboration and initiative for establishing multidisciplinary deep-ocean timeseries observatories

COLLABORATORS WITHIN THE LAST 48 MONTHS (other than those above)

W.Zenk, M.Rhein, M.Visbeck, A.Chave, R.Lampitt, D.Wallace, A.Clarke, J.Lilly

ADVISORS

M.Sc. advisor: I.Robinson (Southampton)
Ph.D. advisor: C.Winant (SIO), R.Beardsley (WHOI)

GRADUATE STUDENTS ADVISED

Diploma students:
Michael Reich (2001), Daniela Weber (2001), Lutz Helmbrecht (2002), Lars Boehme (2003), Hauke Schmidt (current), Jochen Koenig (current), Christian Begler (current)
Ph.D. students:
Torsten Kanzow (current), Andreas Macrander (current), Tom Avsic (current), Matthias Lankhorst (current), Sunke Schmidt (current)

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EDUCATION

S.B. Massachusetts Institute of Technology, 1966 (Civil Engineering)
S.M. Massachusetts Institute of Technology, 1968 (Civil Engineering)
Ph.D. Massachusetts Institute of Technology, 1971 (Civil Engineering)

POSITIONS

Research Engineer, Tennessee Valley Authority, 1971-74; Assistant Professor of Civil Engineering, MIT, 1974-1976; Associate Professor of Civil Engineering, MIT, 1976-1992; Visiting Associate, Division of Engineering and Applied Science, Caltech, 1992-1994; Adjunct Professor, Civil and Environmental Engineering Department, UCLA, 1992-1996; Professor of Civil and Environmental Engineering, UCLA, 1996-present.

AWARDS AND HONORS

Hertz Graduate Fellowship; American Society of Civil Engineers Stevens Award and Huber Research Prize; MIT Civil Engineering Department and Graduate Student Council Teaching Awards; UCLA ASCE Student Chapter Outstanding Professor Award.

SELECTED PUBLICATIONS

Anderson, D. M., and K. D. Stolzenbach. 1985. Selective retention of two dinoflagellates in a well-mixed estuarine embayment: The importance of diel migration and surface avoidance. *Marine Ecology-Progress Series* 25, 39-50.

Stolzenbach, K. D., J. T. Kildow, and E. T. Harding, eds., *Public Waste Management and the Ocean Choice,* MIT Sea Grant College Program, 1986.

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Westerink, J. J., J. J. Connor, and K. D. Stolzenbach. 1987. A primitive pseudo wave equation formulation for solving the harmonic shallow water equation. *Advances in Water Resources* 10, 188-199.

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Westerink, J. J., K. D. Stolzenbach, and J. J. Connor. 1989. General spectral computation of the non-linear shallow water tidal interactions within the Bight of Abaca. *Journal of Physical Oceanography* 19(9), 1348-1371.

Newman, K. A., F. M. M. Morel, and K. D. Stolzenbach. 1990. Settling and coagulation characteristics of fluorescent tracer particles determined by flow cytometry and fluorometry. *Environmental Science and Technology* 24(4), 506-513.

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Stolzenbach, K. D., K. N. Newman, and C. Wang. 1992. Aggregation of fine particles at the sediment-water interface. *Journal of Geophysical Research* 97, 17889-17898.

Stolzenbach, K. D. 1993. Scavenging of small particles by fast-sinking porous aggregates. *Deep-Sea Research I* 40, 359-369.

Bowen, J. D., K. D. Stolzenbach, and S. W. Chisholm. 1993. Simulating bacterial clustering around phytoplankton cells in a turbulent ocean. *Limnology and Oceanography* 38(1), 36-51.

Stolzenbach, K. D., and M. Elimelech. 1994. The effect of particle density on collisions between sinking particles: Implications for particle aggregation in the ocean. *Deep-Sea Research I* 41, 469-483.

Richardson, L. L., and K. D. Stolzenbach. 1995. Phytoplankton cell size and the development of microenvironments. *FEMS Microbiology Ecology* 16(3), 185-191,

Newman. K.A., and K. D. Stolzenbach. 1996. Kinetics of aggregation and disaggregation of titanium dioxide particles and glass beads in a sheared fluid suspension. *Colloids and Surfaces A: Physiochemical and Engineering Aspects* 107, 189-203.

Mazzolani, G., K. D. Stolzenbach, and M. Elimelech. "Gravity-induced Coagulation of Spherical Particles of Different Size and Density." *Journal of Colloid and Interface Science* 197:334-347. 1998.

Adams. E.E., K.D. Stolzenbach, J-J Lee, J. Caroli, and D. Funk. Deposition of contaminated sediments in boston harbor studied using fluorescent dye and particle tracers. *Estuarine, Coastal, and Shelf Science* 46:371-382. 1998.

Stolzenbach, K.D., and E.E. Adams, eds., *Contaminated Sediments in Boston Harbor*, MIT Sea Grant College Program, 1998.

Kim, A.S., and K.D. Stolzenbach. The permeability of synthetic fractal aggregates with realistic three-dimensional structure. *Journal of Colloid and Interface Science*, 253(2): 315-328, 2002.

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Kim A.S., and K.D.Stolzenbach KD. Aggregate formation and collision efficiency in differential settling. *Journal of Colloid & Interface Science.* 271(1):110-119, 2004.

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Scripps Institution of Oceanography
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DOD security clearance: Secret

Professional Interests

- Applied ocean sciences and technology development: coastal observing systems and technology transfer for water quality monitoring, naval hydrodynamics, sensor development, electromagnetic and hyperspectral remote sensing of the air-sea interface, ocean measurement platforms (hf radar, moorings, buoys, autonomous and towed vehicles, fixed platforms), coastal and ocean engineering, renewable energy resources. Marine hydrodynamics.
- Air-sea interaction processes: surface waves, wave breaking, near-surface turbulence and bubbles, fluxes of heat, gas, and momentum; extreme forcing events (hurricanes)
- Acoustical oceanography: application of high-frequency acoustics to nearshore, coastal, upper ocean studies, and large scale vessel flows; sound propagation through bubbly flows

Project Experience:
Served as principal investigator for funded research projects in the above disciplines with sponsorship from the Office of Naval Research (ONR), National Science Foundation (NSF), National Oceans and Atmospheric Administration (NOAA), USN-Carderock, City of Imperial Beach, County of San Diego, and State of California. Previous and current funding exceeds $18M and has included the management of complex, multi-investigator awards.

Employment History

Chief Operations Officer	Southern California Coastal Ocean Observing	2004-present
Director of CORDC	Scripps Institution of Oceanography, UCSD	2003-present
Assistant Research Oceanographer	Scripps Institution of Oceanography, UCSD	2003-present
Assistant Project Scientist (50%)	Scripps Institution of Oceanography, UCSD	1999-2003
Principal Development Engineer (50%)	Scripps Institution of Oceanography, UCSD	1999-2003
Postgraduate Researcher	Scripps Institution of Oceanography, UCSD	1998-1999
Graduate Student Researcher	Scripps Institution of Oceanography, UCSD	1992-1998
casual consultant	Coastal Environments	1992-1998
intern and technician	University of Hawaii	1990

Education

- Ph.D. Physical Oceanography - Applied Ocean Sciences

Scripps Institution of Oceanography, University of California, San Diego. February 1998.

- B.S. Applied Mechanics and Engineering Science (*magna cum laude*),

University of California, San Diego, March 1993.

- graduate coursework in coastal and ocean engineering , University of New South Wales, Sydney Australia. 1991.

Synergistic Activities
NSF Ocean Research Interactive Observatory Networks workshop steering committee member. State of California Coastal Ocean Currents Monitoring Program, executive committee. Developer and manager of the San Diego Coastal Ocean Observing System (www.sdcoos.ucsd.edu). Co-Principal Investigator for federal and state funding for the Southern California Coastal Ocean Observing System. Scientific liaison to local agencies and conservancies in assisting with local coastal environmental issues. Acoustical Oceanography Technical committee for the Acoustical Society of America, grant reviewer for ocean energy related proposals to the California Energy Small Grant Program.

Field Experience: Chief Scientist on many oceanographic research cruises and field experiments using research vessels, navy boats, autonomous vehicles, aircraft, towed vehicles, and surface and subsurface moorings. Chief scientist for San Diego Coastal Ocean Observing System (http://www.sdcoos.ucsd.edu) and Chief Operations Officer for the Southern California Coastal Ocean Observing System (http://www.sccoos.org).

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EDUCATION:

B.A., Botany, 1962, Pomona College, Claremont, CA (Special emphasis on plant ecology)
Ph.D., Marine Ecology, 1969, Scripps Institution of Oceanography (SIO)
University of California, San Diego (UCSD) (Special emphasis on marine ecology)

PROFESSIONAL EXPERIENCE:

(2001-Indefinite) Co-director, Integrative Oceanography Division, SIO
(2000-Indefinite) SIO Representative to the California Cooperative Oceanic Fisheries Investigations Committee
(1985-Indefinite) Research Oceanographer, IOD/SIO/UCSD
(1985-1997 and 2000 - Present) Sr. Lecturer, SIO, non-salaried
(1980-1985) Associate Research Oceanographer, SIO/UCSD
(1974-1985) Lecturer, SIO/UCSD
(1971-1980) Assistant Researcher Oceanographer, SIO/UCSD
(1969-1971) Postgraduate Research Biologist, SIO/UCSD
(1965-1968) Research Assistant, SIO/UCSD

PROFESSIONAL ACTIVITIES:

(1997-Present) UCSD Representative, National Assoc. of State Universities & Land Grant Colleges, Section on Fish & Wildlife Resources
(1996-Present) Editorial Board, Ciencias Marinas
(1992-Present) Editorial Board, Journal of Plankton Research
(1988-Present) The Oceanography Society
(1985-1990) Member, Advisory Council, National Coastal Resource Research and Development Institute
(1982-1985) Member, California Condor Advisory Committee to the California Fish and Game Commission
(1982-1983) Member, Pacific Resource Evaluation Team, National Marine Sanctuaries Program
(1980-1986) Member, Scientific and Statistical Committee, Pacific Fishery Management Council
(1980-1983) Member, Fisheries Advisory Committee
(1980) President, California Wildlife Conservation Board
(1976-1982) Member, California Fish and Game Commission (Vice President, 1979; President, 1980)
(1974-1978) Editorial Committee for SCOR-sponsored manual on phytoplankton
(1973-Indefinite) Member, American Society of Limnology and Oceanography

TEACHING EXPERIENCE:

Applied Statistics, Winter & Spring 1974, 1976, 1978
Marine Phytoplankton, Winter 1976
Computer-aided Statistics, Spring 1977
Applied Nonparametric Statistics, Spring 1983 – 1995, 1987, 1989, 1992, 1995, 2000

RESEARCH INTERESTS:

Ecology of phytoplankton in North Pacific Ocean; Applied statistics

HONORS AND AWARDS:

One of ten outstanding young citizens of San Diego, San Diego Jaycees, 1977
Headliner of the Year in Science, San Diego Press Club, 1977

APPENDIX C

National Environmental Policy Act (NEPA) Compliance Documentation

NOAA/CSC FFO
Southern California Coastal Ocean Observing System (SCCOOS) Proposal: RCOOS Development

Responses to NEPA Questions

Question C1. Is the proposed activity going to be conducted in partnership with NOAA or would the proposed activity require NOAA's direct involvement, activity, or oversight? If yes, describe NOAA's involvement, activity, or oversight, including the name of the office or program that is involved. NO

Question C2. Would the proposed activity involve any other federal agency(ies) partnership, direct involvement, activity, or oversight? If yes, provide the name(s) of the agency(ies) and describe its involvement, activity, or oversight. NO

Question D1. Provide a brief description of the location of the proposed activity. See Proposal and NEPA Categorical Exemption.

Question E1. List any federal, state, or local permits, authorizations, or waivers that would be required to complete the proposed activity. See applicable site permission and license documents that follow. Provide the date the permit, authorization, or waiver was obtained or will be obtained. Provide copies of the permit, authorization, or waiver as appropriate. Was a NEPA analysis prepared for the permit, authorization, or waiver? NO. If yes, state the title of the NEPA analysis and provide copies of the NEPA analysis.

Question F1. Is there the potential for the proposed activity to cause changes that would be different from normal ambient conditions (e.g., temperature, light, turbidity, noise, other human activity levels, etc.)? If yes, describe the changes and the circumstances that would cause these changes. NO

National Environmental Policy Act
(NEPA)
Compliance

The work and activity to be performed under this grant award, NA17RJ1231, was reviewed by the National Marine Fisheries Service (NMFS) and appropriate NOAA authorities to determine what documentation would be necessary to comply with the National Environmental Policy Act (NEPA) in July, 2004. It was then determined that the activities and work proposed and funded under this grant would not require the creation of an Environmental Risk Assessment (ERA) or an Environmental Impact Statement (EIS). Rather, the NMFS and NOAA authorities determined that the proposed work qualified under a Categorical Exclusion.

The document to support this finding, a Memorandum from Margaret Davidson, the Director of NOAA Coastal Services Center, dated July 1, 2004, is included herein in the following pages.

Please direct any questions regarding this matter to David Lane, at (858) 822-2344 or Dr. Eric Terrill at (858) 822-3101, or the points of contact provided on the Memorandum.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Coastal Services Center
2234 South Hobson Avenue
Charleston, South Carolina 29405-2413

MEMORANDUM FOR: **File NA17RJ1231 (JIMO) - SCCOOS**

FROM: **Margaret Davidson**
Director, NOAA Coastal Services Center

SUBJECT: **Categorical Exclusion for the Southern California Coastal Ocean Observing System (SCCOOS) Project, an amendment to Grant Award NA17RJ1231, awarded to Scripps Institution of Oceanography through the Joint Institute for Marine Observations (JIMO)**

DATE: **1 July 04 (update of 14 June 04 file memo)**

Introduction-

NOAA's Environmental Review Procedure, NAO Section 216, requires all proposed projects to be reviewed with respect to environmental consequences on the human environment in accordance with the National Environmental Policy Act (NEPA, 40 CFR 1500-08). This memorandum addresses the application and requirements of NAO Section 216 and NEPA and the appropriate issuance of grant award number NA17RJ1231 to Dr. Orcutt, of the Scripps Institution of Oceanography.

Description of project-

Grant number NA17RJ1231 would award the Scripps Institution of Oceanography approximately $1,949,217 to conduct and manage a pilot project entitled, "Southern California Coastal Ocean Observing System (SCCOOS): Shelf to Shoreline Observatory Development". The goals of SCCOOS are to develop and coordinate individual institutional and state and federal efforts to create an integrated, multidisciplinary coastal observatory in the Southern California Bight. The SCCOOS consortium consists of eleven Southern California universities and laboratories that surround the Southern California Bight. In its present form, Scripps Institution of Oceanography is acting as the central contracts, grants, and management office for SCCOOS. Information collected through the most reliable and most efficient technologies for monitoring and predicting vital characteristics of the state's coastal waters will be provided to the public for the benefit of improving the management of the state's coastal regions. The pilot project proposed by members of SCCOOS will be to collect, integrate, and make available valuable oceanographic data that is presently being collected and managed by multiple agencies interested in the marine environment and

implement and evaluate new sensor technologies. The SCCOOS pilot project is designed to supplement the data where needed and to improve the utility of the collected data.

The SCCOOS objective is to integrate the extensive data taking by dischargers, regulators, managers, and researchers, to utilize the data more efficiently, and to create models that will describe and predict ocean characteristics. The benefits from SCCOOS will include real-time observations, model/data-based forecasts, and a flexible information distribution system, which will provide critical information to users.

A. Data Provided by Consortium Members

A growing number of consortium members are maintaining programs that will contribute to the SCCOOS Program. These programs include compliance monitoring efforts driven by local NPDES permit holders, local health agencies, the California Cooperative Oceanic Fisheries Investigations (CALCOFI), the Coastal Data Information Program (CDIP), the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), HF radar networks, shore stations, and mooring arrays operated by SCCOOS partners, and federally sponsored backbone activities such as the National Data Buoy Center (NDBC) and National Weather Service (NWS).

Data resulting from consortium members' efforts will contribute to outreach programs and for assisting state and federal needs concerning, for example, water quality, safety, and coastline management.

B. Proposed Data Collection

The SCCOOS pilot project will undertake the following tasks for collecting new data over the 3-year period of performance outlined in the proposal:

(1) Install and maintain three (3) shallow-water, multidisciplinary moorings off Santa Barbara, Santa Monica, and La Jolla for the testing and evaluation of new bio-optical sensors. In addition, the existing physical oceanographic moorings designed for measurement of currents and ocean temperatures will be supported by the pilot project in the Santa Barbara Channel.

(2) Deploy and recover commercially available GPS tracked drifters in the field of view of existing and proposed HF current mapping radars.

(3) Observe nearshore surf-zone circulation and wave transformation modeling.

(4) Build and deploy buoyancy controlled underwater gliders on two transect lines. The lines will be offshore San Diego and Los Angeles.

(5) Deploy a REMUS AUV in the nearshore region of Southern California with optical sensors.

(6) Purchase and operate two (2) long-range HF radar systems from the CODAROS Company. Tentative sites identified for this effort include San Diego and San Clemente Island.

(7) Extend the CALCOFI program inshore to complement discharge agency hydrography. In addition, the genetic analysis of Rockfish will be conducted to assess species distribution.

These enumerated methods of data collection, which will be funded under this grant award, will be managed by SIO and/or a number of SIO subcontractors.

C. Data Utilization

In addition to data collection, the SCCOOS pilot project will undertake the following tasks for utilizing new data over the 3-year period of performance outlined in the proposal:

(1) Develop and operate a real-time, data assimilation and modeling system for the Southern California Bight.
(2) Continually acquire, distribute, and generate new products from remote sensing data from NASA and NOAA satellites.
(3) Assemble and integrate existing bathymetry and sub-bottom data sets for Southern California Bight.
(4) Develop and deploy a data management and data distribution system to integrate both SCCOOS and non-SCCOOS consortia data for open and rapid distribution.

Effects of the Project-

The environmental effects of the SCCOOS pilot program project will be limited to the deployment system of moored sensors. The mooring systems, each consisting of a steel chain and railroad wheel, will not significantly damage the environment and collectively, would cover no more than twenty-two square feet of bottom area.

Sensors and radars, such as the GPS and depth meters, which may utilize radio-frequency signals, likewise have never been known to pose any environmental effect and are considered standard oceanographic equipment routinely used by NOAA and other federal agencies.

Autonomous platforms (gliders, drifters, AUV) will carry environmentally benign sensors such as current, temperature, and depth meters that do not affect the environment. Deployed equipment and sensors will be recovered upon the respective completion of data collection. All instruments, platforms, and deployable machinery will be operated and deployed in a manner consistent with local and State rules and regulations.

Addition to File Memo (1 July 04)

A 14 June 04 version of this letter and NEPA CE checklist was sent to Steve Kokinakis for review. In addition, the FPO also requested that the applicant supply information regarding existing permits relevant to work proposed in the application. In response, the applicant provided the following:

- Copy of a Sept 2002 letter from the US Coast Guard granting approval to the University of California for a "private" mooring in Santa Monica Bay;
- A proposal from the US Geological Survey to the National Marine Fisheries Service to use an acoustic sediment profiler in waters around the Hawaiian Islands (includes descriptions of potential incidental harassment of marine mammals in the Hawaii region);

- Copy of a Sept 2001 letter from Donald Knowles, Office of Protected Species (NOAA/NMFS), granting approval to Walter Barnhardt of the US Geological Survey to operate an acoustic sediment profiler (a boomer system) in Hawaiian waters;

Categorical Exclusion-

A categorical exclusion (NAO 216-6) is appropriate in the implementation of the SCCOOS Program because the proposed action has been evaluated and determined to fall into a category of action that will not individually or cumulatively have significant impact on the quality of the human environment as defined in the NEPA (40 CFR 1508.27). Furthermore, the proposed action is not new, does not concern extraordinary circumstances, does not involve controversial potential environmental impacts, nor does it comprise a management plan.

As defined in Sections 6.03c3 (a) and (i) of NAO 216-6, the proposed action is, in part, a "Research Program" and, in part, an "Action Not Having Significant Environmental Impact".

A. Section 6.03c3 (a) of NAO 216-6

Those activities enumerated above under "B. Proposed Data Collection" are appropriately defined as an environmental monitoring program conducted with a variety of gear (satellite and ground-based sensors, fish nets, etc.) in the marine environment and, therefore, categorically excluded from further Environmental Assessment by Section 6.03c3 (a) of NAO 216-6, which states:

> "(a) Research Programs. Programs or projects of limited size and magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible. Examples include natural resource inventories and environmental monitoring programs conducted with a variety of gear (satellite and ground-based sensors, fish nets, etc.) in water, air, or land environs. Such projects may be conducted in a wide geographic area without need for an environmental document provided related environmental consequences are limited or short-term."

The nine methods of data collection, whether considered individually or cumulatively, are limited to discrete areas of the Southern California Bight and represent brief data samplings having small magnitude. More particularly, the sensors, drifters, and radar at issue do not harm the environment significantly or produce short-term, cumulative, or long-term effects. Any possible effects will be isolated to benthic areas scanned by side scan and chirp radar and these effects will be short-lived and insignificant, as the effected benthos will withstand or rejuvenate immediately after exposure to energy of radio frequencies. Radio frequencies of the ranges proposed are not known to cause harmful effects in animals or plant structures.

B. Section 6.03c3 (i) of NAO 216-6

Those activities discussed above under "C. Data Utilization" are categorically excluded from further Environmental Assessment by Section 6.03c3 (i) of NAO 216-6:

> "(i) Other Categories of Actions Not Having Significant Environmental Impacts. These actions include: routine operations and routine maintenance, preparation of regulations, Orders, manuals, or other guidance that implement, but do not substantially change these documents, or other guidance; policy directives, regulations and guidelines of an administrative, financial, legal, technical or procedural nature, or the environmental effects of which are too broad, speculative or conjectural to lend themselves to meaningful analysis and will be subject later to the NEPA process, either collectively or case-by-case; activities which are educational, informational, advisory or consultative to other agencies, public and private entities, visitors, individuals or the general public; actions with short term effects, or actions of limited size or magnitude."

The remainder of proposed activity consists of communication and collaboration between consortium members, data manipulation and analysis, such as computer-modeling, as well as, engaging all consortium members in outreach programs and data distribution. Accordingly, the remainder of activity is technical in nature and is cumulatively, an 'Action Not Having Significant Environmental Impacts'.

Lastly, and for clarification, those activities discussed above under "A. Data Provided by Consortium Members" are presently independently managed and funded by government and other agencies and, therefore, not governed by NAO 216.

In Conclusion-

The preparation of an Environmental Assessment or Environmental Impact Statement is required for proposed actions that would involve extraordinary circumstances, such as a geographic area with unique characteristics, are subject of public controversy based on potential environmental consequences, have uncertain environmental impacts or unique or unknown risks, establish a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have any adverse effects upon endangered or threatened species or their habitats. The SCCOOS Program, however, does not involve any extraordinary circumstance and does not raise the potential for significant environmental impact under NEPA (40 CFR 1508).

Accordingly, the SCCOOS Program, as presented in this application, should be categorically excluded from the need to prepare an Environmental Assessment or Environmental Impact Statement.

Categorical Exclusion Checklist for Non-Construction
National Oceanic and Atmospheric Administration Grants

The purpose of this checklist is to assist National Oceanic and Atmospheric Administration's (NOAA) responsible program managers (RPMs) in determining if the grant(s) they are proposing qualifies for categorical exclusion status under NOAA's National Environmental Policy Act (NEPA) guidelines. Normally, NOAA grants qualify for categorical exclusion from NEPA requirements when the environmental effects are minor or negligible. However, as stated in NOAA's guidelines for implementing NEPA (NAO 216-6; http://www.rdc.noaa.gov/~nao/216-6.html) at 5.05.c, under certain conditions, preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) is required for proposed grants when 1) a grant program is entirely new; 2) under extraordinary circumstances in which normally excluded actions may have a significant environmental impact; or 3) potential impacts associated with the grant are highly controversial. By answering the questions in this checklist, the RPM can determine whether the effects of the grant qualify for categorical exclusion, or require further NEPA documentation in the form of an EA or an EIS. This checklist should be filled out for a grant which is not automatically determined to require an EA or EIS in order to establish compliance with administrative record requirements regarding categorical exclusions (CEs).

NOAA Grant Program: NOAA Coastal Services Center
- Coastal Observation Technology System Projects
- Coastal & Ocean Observing System Pilot Projects

Please provide answers to the following questions:

1. Identify:
   - NOAA Award Number: NA17RJ1231
   - Award Recipient: Dr. Orcutt, of the Scripps Institution of Oceanography
   - Project Title: Southern California Coastal Ocean Observing System: Shelf to Shoreline Observatory Development

2. Attach a brief (.5 page), but specific project description, including: geographical location, and the goal and scope of project, and activities that should be considered in a NEPA assessment.

3. Does the grant involve any federal permits, or other federal agency direct involvement, activity, oversight, or funding?
   Yes ( ) No (X)

4. Could this NOAA grant have significant effects on public health or safety?
   Yes ( ) No (X)

   Specifically, will the proposed action:

   - Create high levels of noise for an extended period of time?

Yes ( ) No (X)

- Have long or short term aesthetic effects, e.g., visual effects or effects on scenery?
  Yes ( ) No (X)

- Require large amounts of outdoor lighting or create any unusual odors?
  Yes ( ) No (X)

- Require large amounts of water or electricity for an extended period or time?
  Yes ( ) No (X)

- Have long or short term effects on the transportation infrastructure, or create a significant increase in local traffic?
  Yes ( ) No (X)

5. Could this NOAA grant have significant adverse impacts on any geographic area(s) with unique characteristics? Areas to consider include coral reefs, marine protected areas, marine sanctuaries, essential fish habitat, historic or cultural resources, park or refuge lands, wild or scenic rivers, wetlands, or ecologically significant or critical areas, including those listed on the National Register of Natural Landmarks, or listed or eligible for listing on the National Register of Historic Places.
   Yes ( ) No (X)

   Specifically, will the proposed action:

- Degrade or disturb coral reefs?
  Yes ( ) No (X)

- Degrade or disturb previously undisturbed areas?
  Yes ( ) No (X)

- Affect any areas such as wetlands and flood plains?
  Yes ( ) No (X)

- Disturb archaeological or historic resources?
  Yes ( ) No (X)

8. Could this NOAA grant have highly uncertain and potentially significant environmental effects or involve unique or unknown risks?
   Yes ( ) No (X)

   Specifically, will the proposed action:

- Potentially result in the introduction or spread of a nonindigenous species?
  Yes ( ) No (X)

- Involve aquaculture activities that could result in the introduction or spread of invasive

or non-indigenous species?
Yes ( ) No (X)

- Significantly impact water resources such as surface or groundwater?
  Yes ( ) No (X)

- Significantly contribute to water degradation or impairment?
  Yes ( ) No (X)

- Generate large amounts of hazardous waste or any toxic waste?
  Yes ( ) No (X)

- Emit dangerous levels of ionizing or nonionizing radiation?
  Yes ( ) No (X)

- Result (directly or indirectly) in the generation of large amounts of air pollution?
  Yes ( ) No (X)

9. Could this NOAA grant have adverse effects on species listed or proposed to be listed as Endangered or Threatened, or have adverse effects on designated critical habitats?
   Yes ( ) No (X)

10. Will this grant threaten to violate a Federal state, local, or tribal law imposed for the protection of the environment?
    Yes ( ) No (X)

11. Will this NOAA grant have highly controversial environmental effects (i.e, are the effects likely to be subject to serious scientific dispute)?
    Yes ( ) No (X)

IF YES WAS CHECKED FOR ANY OF THE ITEMS ABOVE: Please list the item number, provide additional information about anticipated effects, and contact the NEPA Coordinator at NOAA's Office of Strategic Planning (301-713-1622) as soon as possible to discuss alternatives for providing NEPA documentation.

IF NO WAS CHECKED FOR ALL OF THE ITEMS ABOVE: The grant activity may qualify for a Categorical Exclusion (CE).

Eric Terrill, 8851 Shellback Way, Keck Center #253, La Jolla, CA 92093-0213,

United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
RADIO STATION CONSTRUCTION PERMIT
AND LICENSE

EXPERIMENTAL	WC2XYM
(Nature of Service)	(Call Sign)
XD FX MO	0067-EX-ML-2004
(Class of Station)	(File Number)

NAME Scripps Institution of Oceanography, U.C. San Diego

Subject to the provisions of the Communications Act of 1934, subsequent acts, and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions and requirements set forth in this license, the licensee hereof is hereby authorized to use and operate the radio transmitting facilities hereinafter described for radio communications in accordance with the program of experimentation described by the licensee in its application for license.

Operation: In accordance with Sec. 5.3(h) of the Commission's Rules

Station Locations

(1) Imperial Beach (SAN DIEGO), CA - NL 32-32-09; WL 117-07-32; MOBILE: , within 5 km
(2) Point Loma (SAN DIEGO), CA - NL 32-39-50; WL 117-14-28; MOBILE: , within 5 km
(3) La Jolla (SAN DIEGO), CA - NL 32-52-00; WL 117-15-24; MOBILE: within 5 km, within 5 km
(4) San Clemente Island, CA - NL 33-00-15; WL 118-33-15; MOBILE:within 5 km

Frequency Information

Imperial Beach (SAN DIEGO), CA - NL 32-32-09; WL 117-07-32; MOBILE: , within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
24700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25100 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25500 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

This authorization effective November 15, 2004 and
will expire 3:00 A.M. EST September 01, 2007

FEDERAL COMMUNICATIONS COMMISSION

Frequency Information

Imperial Beach (SAN DIEGO), CA - NL 32-32-09; WL 117-07-32; MOBILE: , within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
25900 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26300 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

Point Loma (SAN DIEGO), CA - NL 32-39-50; WL 117-14-28; MOBILE: , within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
4300 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
4400 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5100 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5200 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
24700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25100 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

Frequency Information

Point Loma (SAN DIEGO), CA - NL 32-39-50; WL 117-14-28; MOBILE: , within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
25500 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25900 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26300 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

La Jolla (SAN DIEGO), CA - NL 32-52-00; WL 117-15-24; MOBILE: within 5 km, within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
4300 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
4400 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5100 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5200 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
24700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

Frequency Information

La Jolla (SAN DIEGO), CA - NL 32-52-00; WL 117-15-24; MOBILE: within 5 km, within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
25100 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25500 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
25900 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26300 kHZ	FX	500KP0N	40 W (ERP)	0.001 %
26700 kHZ	FX	500KP0N	40 W (ERP)	0.001 %

San Clemente Island, CA - NL 33-00-15; WL 118-33-15; MOBILE:within 5 km

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
4300 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
4400 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5100 kHZ	FX	100KP0N	40 W (ERP)	0.001 %
5200 kHZ	FX	100KP0N	40 W (ERP)	0.001 %

Special Conditions:

(1) The station identification requirements of Section 5.115 of the Commission's Rules are waived.

Department of the Navy
Naval Facilities Engineering Command Southwest, UIC: 62473
Public Works, Facilities Planning, Code GRRMNP, Bldg. 3
Naval Base Coronado, P.O. Box 357040, San Diego CA 92135-7040

11000
Ser N46C/0001
3 Jan 06

MEMORANDUM

From: Public Works Officer, Naval Base Coronado
To: Commanding Officer, Naval Pacific Meteorology and Oceanography Center
(ATTN: LCDR Erich Rehberg)

Subj: SITE APPROVAL REQUEST SAR-05-065, INSTALLATION OF A SURFACE CURRENT MAPPING RECEIVE ANTENNA SYSTEM AT STONE STATION (PEAK), SCI

Ref: (a) Site Approval Request of 2 May 05
(b) Basic Facilities Requirements, NAS North Island of Feb 97
(c) Base Exterior Architectural Plan, NAS North Island
(d) OPNAVINST 5090.1

1. In response to reference (a), work approval is granted to install a receive antenna to test and map the surface currents in Southern California. Specifically, the Marine Physical Laboratory, part of Scripps Institution of Oceanography (SIO), University of California San Diego (UCSD) has been funded by NOAA to initiate shelf to shoreline observatory developments creating an ocean observation system within the Southern California Bight. This work approval is granted contingent upon satisfying the requirements noted below. The work approval is granted based on the present condition of the site and requirements supported by references (a) through (d). Prior to the commencement of any work affecting the exterior appearance of historic buildings or undisturbed areas, Naval Base Coronado, Public Works Officer approval is required. Work Approval is a concurrence with the suitability of the requested site to satisfy the work requirements. This Work Approval will expire one year from the date of this letter. Should the subject work not be started by then, a request for Work Approval re-validation must be submitted in writing to this command for appropriate site review to verify all existing conditions continue to be met and any new requirements are identified.

2. Naval Facilities Engineering Command Southwest (NAVFAC Southwest), Coastal Integrated Product Team (CIPT), Utilities Mark Out Service (UMOS) is required and must be accomplished prior to the removal of any utility lines or subsurface excavation. Contact UMOS ten working days in advance of excavating at 619-556-7348/7960, and submit a request for Locate Services five days in advance of excavation. Please site utility plans and connections during the planning phase vice construction phase. UMOS does not perform on-site surveying services.

3. Alterations, Repairs and Minor Construction on Naval Base Coronado require the Public Works Officer's approval. The Public Works Officer (PWO) has approved the scope of work as defined in reference (a).

4. This approval is not authority to conduct work on Naval Property via entities outside the NAVFAC Southwest. If such authority is desired, all Navy and local requirements and approvals must be met.

Subj: SITE APPROVAL REQUEST SAR-05-065, INSTALLATION OF A SURFACE CURRENT MAPPING RECEIVE ANTENNA SYSTEM AT STONE STATION (PEAK), SCI

5. The Public Works Team, Naval Base Coronado point of contact for any questions regarding this Work Approval is Ms. Brenda G. Bautistá, Code N46C at (619) 545-1123.

BRENDA G. BAUTISTA
Facility Planner

Copy to:
Ms. Lisa Hazard, SIO UCSD

APPENDIX D

UNOLS Ship Request Forms

UNOLS Ship Time Request Form - Section ONE

UNOLS Request ID #: 20061128185724WZ
Version #: 002
Last Modified: 2007/04/10 19:48 EDT
Date Issued: 2007/04/10 19:48 EDT

P.I. Name Last: Goericke First: Ralf MI: -

Institution: Scripps Inst.of Oceanography Research vessel required for:
Address: 9500 Gilman Dr. X Ancillary Only
La Jolla, CA 92093 _ Principal Use
_ No Ship Required
_ Long Range Planning Document

Phone: 858 534-7970 Fax: - Email:
<mailto:rgoericke@ucsd.edu>rgoericke@ucsd.edu

Co P.I. Name	Institution	Co P.I. Name	Institution

Proposal Title:

SCCOOS Proposal 2006

Large Program Name: None Research Purpose: Biological Oceanography
If Other, specify: If Other, specify:

New Proposal? Y Agency Submitted to: Foreign EEZ? N
Funded Grant? N NOAA
Institutional Proposal #: Amount Requested: Area(s) of Operation:
UCSD #2007-1103 1,876,737 NP9
Agency Proposal #:
#NOS-CSC-2007-2000865 Lat/Long:
Renewal? N Start Date: October 1, 2007 Begin:
Grant #: End Date: September 30, 2008 End:

Year	Ship(s) Requested (Name or Size)	# Science Days Req.	Optimum Dates	Alternate Dates
2007	New Horizon	1	10/10/07	

==========

Total Science & Ship Days Needed: ---------- PORTS ----------

1	Start:	Intermediate:	End:
Number in Science Party:	San Diego		San Diego

==========

Equipment Required:

_ Vans _ P-Code GPS _ MCS _ Alvin _ ABE

_ Dynamic Positioning _ Multibeam _ SCS _ ROV _ 680 Cond.

_ Helicopter Operation

==========

Other Special Equipment; Comments:

---

adjunct to standard CalCOFI cruise - pw schiller

==========

UNOLS Ship Time Request Form - Section ONE

UNOLS Request ID #: 20070404145407ST
Version #: 003
Last Modified: 2007/04/11 11:16 EDT
Date Issued: 2007/04/11 11:23 EDT

P.I. Name Last: Send First: Uwe MI:

Institution: Scripps Institution of Oceanography (SIO) - UCSD
Address: Scripps Institution of Oceanography (SIO) - UCSD
9500 Gilman Dr., MailCode 0230,
La Jolla, CA 92093-0230

Research vessel required for:
_ Ancillary Only
X Principal Use
_ No Ship Required
_ Long Range Planning Document

Phone: 858-822-6710 Fax: 858-534-9820 Email: usend@ucsd.edu

Co P.I. Name	Institution	Co P.I. Name	Institution
Terrill, Eric	SIO - UCSD		

Proposal Title:

Southern California Coastal Ocean Observing System

Large Program Name: None
If Other, specify:

Research Purpose: Physical Oceanography
If Other, specify:

New Proposal? Y
Funded Grant? N
Institutional Proposal #: 20071103
Agency Proposal #:

Renewal? N
Grant #:

Agency Submitted to: NOAA
Amount Requested: 1,876,737
Start Date: 10/01/07
End Date: 09/30/08

Foreign EEZ? N
Area(s) of Operation: NP9
Lat/Long:
Begin: 32N 117W
End: 32N 117W

Year	Ship(s) Requested (Name or Size)	# Science Days Req.	Optimum Dates	Alternate Dates
2007	Robert Gordon Sproul	1	10/01/2007	11/01/2007

Total Science & Ship Days Needed: 1

Number in Science Party: 6

PORTS
Start: San Diego
Intermediate: N/A
End: San Diego

Equipment Required:

_ Vans _ P-Code GPS _ MCS _ Alvin _ ABE
_ Dynamic Positioning _ Multibeam _ SCS _ ROV _ 680 Cond.
_ Helicopter Operation

Other Special Equipment; Comments:

==========
==========
UNOLS Ship Time Request Form - Section TWO
==========
Other Scientists Involved in Multi-P.I. Program:

Name	Institution	Phone	E-mail

==========
Are there special considerations of the science party or cruise scheduling?
Consider science time constraints; coordination of equipment shipping;
two-ship operations; weather windows; mooring turn-around; teaching schedules
and others that will affect scheduling decisions.

Weather windows to be considered in the schedule due to the main mission of the cruise: Mooring turn-around. Bad weather could create maneuver difficulties in swapping out the mooring.
==========
SCUBA Diving? X No _ Yes -- Designate Lead Institution:
Individual dives: # Divers on board:
A list of all divers and their certification information must be submitted
to the ship's marine superintendent.
==========
Special Science Party Considerations
X Foreign Nationals _ Medical Conditions _ Disabled Persons _ Other
Please explain:

Uwe Send - Germany - P.I.
Gabriela Chavez - Mexico
Gino Passalacqua - Peru
Christian Begler - Germany
==========
Use of Hazardous Materials? X No _ Yes
If Yes, List type, quantity, and disposal plans:

Radioactive? Type: Quantity:
Disposal Plan:

Explosives? Type: Quantity:
Disposal Plan:

Other? Type: Quantity:
Disposal Plan:

==========
Have you read the RVOC Safety Training Manual-Chapter 1? _ No X Yes
==========
Technician Required (CTD, SCS, MSC, etc): Resident Technicia/Marine Techician
==========

Equipment to be used:

Winches:	Wire:	Conductor	Navigation:	Communication:
X Dredge/Trawl	Mechanical	_ 0.680"	X GPS	_ Inmarsat
_ Hydro	X 9/16"	_ 0.322"	_ DGPS	_ ATS
X CTD	_ 1/2"	_ .225"	_ Loran	_ FAX
X Capstans	_ 1/4"	_ Single	_ Dynamic Positioning	_ Cellular
		_ Multi	_ Other	_ SEANET

X 12 kHz Echosounder	_ Multibeam Sounder	_ Air Compressor
_ 3.5 kHz Echosounder	_ Magnetometer	

	Vans:	Nets:
_ Pingers	_ Refrigerated	_ Dip net
_ Gravity Corers	_ Magazine	_ Plankton
_ Piston Corers	_ Isotope Isolation	_ Neuston
_ Box Corers	_ Lab	_ Bongo
_ Rock Dredges	_ Storage	_ Mid-water trawl
_ Airgun/watergun system	_ Berthing	_ MOCNESS
_ Explosive Handling Gear	_ Chest Freezers	(Size):
_ Thermometers	_ Refrigerators	_ Work boats
X CTD		_ Computer/peripherals
X Rosette Sys.	_ Auto Analyzer	_ PC computers
_ Niskin bottles	_ Salinometer	_ SAIL system
Size:	_ Nutrients	_ Digital XBT
and number:	_ Oxygen titration	_ ADCP
	_ Liquid Scintillation	_ Gravimeter
	_ Uncontaminated seawater	_ IMET

Other Special Equipment; Equipment Requiring Special Handling, Storage or Installation; Comments:

Email this Ship Time Request in (•) PDF/ ( ) ASCII format to:

UNOLS Ship Time Request Form - Section ONE

UNOLS Request ID #: 20070403183506LT
Version #: 003
Last Modified: 2007/04/10 19:06 EDT
Date Issued: 2007/04/10 19:06 EDT

P.I. Name Last: Terrill First: Eric MI:

Institution: Scripps Institution of Oceanography
Address: 9500 Gilman Drive
La Jolla, CA 92093-0213

Research vessel required for:
_ Ancillary Only
X Principal Use
_ No Ship Required
_ Long Range Planning Document

Phone: 858-822-3101 Fax: 858-534-7132 Email: eterrill@ucsd.edu

Co P.I. Name	Institution	Co P.I. Name	Institution

Proposal Title:

The Southern California Coastal Ocean Observing System (SCCOOS)

Large Program Name: None
If Other, specify: NOAA IOOS

Research Purpose: Multi-discipline
If Other, specify:

New Proposal? Y
Funded Grant? N
Institutional Proposal #:
Agency Proposal #:
Renewal? N
Grant #:

Agency Submitted to: NOAA
Amount Requested: 1,876,737
Lat/Long:
Start Date: 10/01/2007 Begin: 32N
End Date: 12/01/2008 End: 117W

Foreign EEZ? N
Area(s) of Operation: NP9

Year	Ship(s) Requested (Name or Size)	# Science Days Req.	Optimum Dates	Alternate Dates
2008	Robert Gordon Sproul	one week	02/01/2008	08/01/2008
2008	New Horizon	one week	add to CALCOFI	add to CALCOFI
2008	Robert Gordon Sproul	one week	08/01/2008	02/01/2008

==========

Total Science & Ship Days Needed: ---------- PORTS ----------

24 days	Start:	Intermediate:	End:
Number in Science Party:	San Diego		San Diego
6			

==========

Equipment Required:

_ Vans _ P-Code GPS _ MCS _ Alvin _ ABE

_ Dynamic Positioning _ Multibeam _ SCS _ ROV _ 680 Cond.

_ Helicopter Operation

==========

Other Special Equipment; Comments:

==========

APPENDIX E

Contextual Description for Proposed RCOOS Activities

Interplay of NOAA RCOOS development activities and funds in the context of the broader SCCOOS ocean observing strategy

Given the enterprise nature of the SCCOOS funding portfolio, we identify here how the proposed RCOOS development funds from NOAA will be directed.

A. Velocity

Monitoring water movement is central to SCCOOS's strategy for coastal pollution, algal blooms and nutrient supply, shoreline hazards, sand transport, oil spill prediction, and search and rescue. Measurements of ocean currents are being made and expanded using a variety of approaches. Effective integration of these data by the SCCOOS data assimilation component is key to the creation of end-user products. These will include:

- Real-time currents and trajectories for search and rescue, spill response, and tracking ocean discharges both from offshore to onshore and stormwater discharges into the surfzone
- Improvements in the assessment and prediction of human health risks from pollution.
- Estimates of the transport of nutrients and early life stages (e.g. eggs and larvae)
- Improved prediction of the movement of algal blooms and pollution.
- Improved beach erosion models
- Improved models of the residence time of water masses within the nearshore

The key observing elements of SCCOOS are described below. Individual Statements of Work are provided in the Appendix.

MOORINGS: resolved vertical structure, high temporal resolution
This proposal will support three multi-disciplinary moorings with Acoustic Doppler Current Profilers (ADCPs) offshore Del Mar (SIO), in Santa Monica Bay (UCLA), and offshore Santa Barbara (UCSB). Data from the moorings will be communicated to NDBC. In the surfzone, fixed point current meters are deployed to validate models of wave-driven circulation.

LONG RANGE HF RADAR: spatially resolved currents, high temporal resolution
This proposal will support the maintenance, and validation of two long-range CODAR systems deployed in San Diego and on the Navy-operated San Clemente Island to resolve surface currents at 6-10 km resolution out to distances of approximately 150 km. Data from San Clemente Island is telemetered to shore using a 2-Mbs link, allowing real-time distribution of current measurements. The funds have also supported a continued dialog, testing, analysis with the USCG that will lead to the co-location of HF radar with their operational equipment. Results from these activities are communicated to other radars operators. The long range systems complement the existing array of short-range HF radars from the Mexico border to Morro Bay as augmented by the State of California Coastal Ocean Current Monitoring Program (COCMP).

DRIFTERS: spatially resolved surface circulation, Lagrangian statistics
This proposal supports the periodic deployment of real-time GPS-tracked drifters (UCSB) to directly record water parcel pathways. The deployments are used to validate HF-radar data and to develop skill with trajectories derived from the

Eulerian measurements (HF radar fields, moorings). Additionally, clusters of drifters will measure sub-grid scales of motion that are not resolved by HF radars or model-derived velocity fields. The deployments have been conducted in support of both oil spill drills and in water quality demonstration exercises.

AUTONOMOUS VEHICLES: time series of sections – capabilities need to be defined

Underwater gliders and AUVs can provide velocity measurements on horizontal scales ranging from 10 m to the shelf width. *This proposal supports gliders (SIO) to repeat sections between the coast and the offshore Channel Islands, profiling to as deep as 500 m every 3 km. The gliders measure velocity depth-averaged to 500 m and temperature and salinity profiles for geostrophic shear. Our build out plan is to maintain three sections: La Jolla to San Clemente Island; San Pedro to San Nicholas Island; and Point Conception to San Miguel Island. A glider will also be used in the San Pedro Shelf area (USC) to measure both physical and optical properties to assist in estimating the ocean state for water quality issues, predicting harmful algal blooms, and tracking outfall and riverine plumes.*

Autonomous underwater vehicles (AUVs) are fast, highly maneuverable vehicles driven by propellers, and steered with movable fins. Two REMUS AUVs are operated by Cal Poly, each supporting upward/downward looking 1200kHz ADCPs with vertical ranges of 30-40 m at O(1)m resolution. Cal Poly routinely operates these vehicles on autonomous transects out to 20 km offshore.

SHIPBOARD ADCPS AND HYDROGRAPHY: depth resolution, long horizontal span

ADCP data from CalCOFI legs and from mooring servicing cruises and hydrographic data collected on CALCOFI legs are available to those mission agencies that have permit-mandated hydrographic data collections.

B. Winds

Wind stress is a central driver of coastal circulation and upwelling. Land orography and local heating cause rapid near-coast variations, making routine wind products inadequate for marine operations or ocean modeling. Since ocean circulation models depend on accurate wind forcing as input, wind fields are evaluated for their ability to provide skill to the models. *This proposal supports both modeling and data management activities that relate to using and interpreting winds including:*

- *Access to Navy generated high resolution wind nowcast and forecasts from the COAMPS system, the archiving of the nowcasts, and the creation of online tools for accessing these data*
- *The management, aggregation, and delivery of data from over 400 coastal meteorological stations. These data are provided to the public in an easy-to-use google maps GIS format.*
- *Ocean circulation model evaluation from varied wind inputs.* Note: COCMP supports additional modeling activities including high resolution MM5/WRF meteorological model development.

C. Ecological Fields

The observing requirements for living resources and HABS overlap. Important to both are physical processes that provide nutrients for primary production, and phytoplankton that cause algal blooms and support food webs. These fields, critical in defining essential fish habitat and HABs, will be SCCOOS foci, particularly in the nearshore. An emphasis will be processes that connect the inner shelf to the offshore ocean and largely determine the availability of nutrients. Measurements will quantify fundamental dynamics such as coastal upwelling, internal waves, and synoptic-scale dynamics. Local coastal upwelling provides nutrients and has been implicated in harmful algal blooms (van Geen et al., 2000). Water column observations will characterize upwelling, while additional wind observations will define its forcing. Internal gravity waves are central to mixing and cross-shelf transport and are important transport mechanisms for nutrients to kelp reefs during summer nutrient-limiting conditions. Currents driven by wind stress and alongshore pressure gradients as well as offshore climatic variations affect nutrient availability, larval dispersal and ocean temperature that may be a factor in survival.

The multidisciplinary moorings observe the meteorology and physical, optical, and chemical ocean properties needed to characterize the continental shelf environment. They monitor transport between inner-shelf and deeper waters and determine how these processes affect water quality, turbidity, nutrient supply, phytoplankton biomass, and ecosystem dynamics with well-resolved time series. Surface measurements will provide ground truth for remotely sensed measurements (HF radar and satellite color, temperature, and winds). Subsurface measurements will define the vertical scales over which the remotely sensed measurements apply. All data will be model assimilated.

Parameters measured at the moorings include: (1) surface wind velocity, air temperature and pressure, relative humidity, solar radiation, and photosynthetically available radiation, (2) ADCPs for ocean velocity, (3) temperature and conductivity sensors, (4) dissolved oxygen sensors, (5) fluorometers for chlorophyll *a* concentration, and (6) beam transmissometers for turbidity. Surface instrument data will be telemetered to shore, processed, and presented on the internet. Additional development work is proposed: in the Santa Barbara Channel, advanced bio-optical sensors; at Santa Monica Bay, pCO_2 measurements; and at San Diego, nutrients and telemetry of subsurface data. These moorings will be deployed and maintained for the three year duration of the program, with the potential expansion of additional moorings at other key sites should funding increase.

The gliders (SIO, USC) and AUVs (Cal Poly) will observe horizontal structure from the large scales where climate variability has a strong effect on the ecosystem, to intermediate scales where fish population and recruitment are correlated with fronts and mesoscale eddies, to the smallest scales of algal blooms and the local effects of outfalls and rivers. The mainland-to-Channel-Islands glider sections that end in water of 50 m depth will document the transition from pelagic to nearshore ecosystems. AUVs will conduct systematic high-resolution surveys to resolve features revealed by gliders and other elements of SCCOOS down to the 10-m scale. AUVs are especially useful in the nearshore region, where they will be able to map algal blooms and the effects of wastewater. All gliders and AUVs will carry sensors to measure

temperature, salinity, fluorescence and turbidity. AUVs will additionally measure oxygen, bioluminescence, and multispectral optical properties.

Nearshore surveys. Ecosystem properties often differ significantly between shelf and offshore areas – entirely different sets of species and very different levels of biomass and rates of primary production are found. The ongoing and federal/state CalCOFI program will provide SCCOOS with fields of physical, chemical and biological properties for the offshore SCB. *To complement these observations, this proposal supports an analogous set of pilot observations in the nearshore. CalCOFI personnel will carry out these surveys by adding one day to the existing 17-day cruises. Observations will be made between Point Conception and San Diego, with continuous sampling between the 100 to 30 m isobaths and 8 CTD stations where bongo-net tows will be taken. These along-shore transects will: (a) link individual observations along the coast (moorings, gliders, agency surveys) to define spatial variability; (b) define and characterize essential elements of nearshore fish habitat (rockfish, sea urchins and kelp [c.f. Lynn, 2003]); (c) gather samples to estimate populations of different species of rockfish; (d) characterize fields of phytoplankton biomass and primary production; and (d) collect validation data (temperature, chlorophyll a, turbidity) for the remote sensing component. Through SCCWRP, we will coordinate this effort with quarterly discharge surveys to provide a synoptic snapshot from the shelf to the shoreline. These data will be distributed publicly through the CalCOFI and SCCOOS data systems to assist regulatory agencies in establishing the linkages to the regions of their primary concern and to facilitate broader scale descriptions of ocean state during monitoring activities.*

Shore Stations. This proposal supports the operations, maintenance, and data management from five shoreline sites that collect high-frequency observations of temperature, salinity, and water level, with a limited number of sites also collecting information on chlorophyll fluorescence and turbidity. Temperature describes internal wave activity and upwelling/mixing events related to larval dispersal, pollutant transport, and nutrient delivery to nearshore environments. Salinity is an index of land runoff. Chlorophyll fluorescence is an index of algal blooms and can be used to trigger intensive sampling of blooms dense enough to be toxic. Automated temperature stations at other piers within Southern California (e.g. LA County www.watchthewater.org) will be integrated with the SCCOOS supported data management system. In addition to electronic records, the 87-year record of daily temperature and salinity at La Jolla and multi-decadal records at several southern California sites will be continued, extending a unique climate record. These data are used by many agencies, e.g., La Jolla temperature is a key input to the annual assessment of sardine environment and stock size. Because they are accessible, these shoreline sites will offer invaluable education and outreach opportunities for the SCCOOS education and outreach program. The data collection effort for the historic shore station program is presently supported by the California Department of Boating and Waterways, with funding from COTS providing the resources for the data management, archiving, and online delivery of data, providing a strategic partnership with this State agency. *Phytoplankton Biomass and Primary Production.* Of fundamental ecological importance are rates of primary production, levels of algal biomass, and community structure, which determine an important dimension of

essential fish habitat and set the stage for harmful algal blooms. Measuring and predicting the effect of nutrient fluxes on algal biomass and rates of primary production are, therefore, critical. Direct measurements of phytoplankton biomass and rates of primary production are too costly to be integrated into large-scale observing systems. *With this proposal, SCCOOS is developing and validating proxy measurements as part of the pilot project. Validation will be carried out utilizing the quarterly CalCOFI cruises to make optical measurements (irradiance, fluorescence, attenuation, backscatter) and measure algal biomass and rates of primary production directly. Algorithms will be developed to calculate algal biomass and primary production from all optical observations made in this project (shore stations, moorings, gliders, CalCOFI cruises). The derived products will be integrated into the operational ROMS forecast system for nowcasts and forecasts of rates of nutrient supply, fields of phytoplankton biomass and primary production. We will also characterize phytoplankton community structure using molecular methods; on a coarse level we will characterize the whole community using chemotaxonomic methods and on a fine level determine the abundance of toxic species of algae. The SCCOOS data management system will make products from this effort available to interested agencies, e.g. the NOAA Southwest Fisheries Science Center (SWFSC) (POCs: Christian Reiss and Richard Charter), the California Department of Fish and Game (CDFG) (POC: Mary Bergen), interested private parties, e.g. kelp harvester Kelco and Catalina Offshore Products, and the NPDES dischargers who desire larger scale ocean state estimations in their quarterly and yearly reports.*

D. Waves and Surfzone Currents

The Coastal Data Information Program (CDIP) maintains 17 wave stations that transmit wave height and direction data to shore receiver stations. Processed data are provided to the marine community via the Internet and to the National Weather Service AFOS system. In California, the buoy stations are typically 10-20 km offshore and 50-100 km apart. CDIP observation-based products include real-time predictions of regional swell heights (periods greater than 8 seconds) and combined sea-and-swell conditions near harbors. These predictions of conditions seaward of the surfzone have been validated extensively. Five-day swell forecasts are also available, and the entire historical data set is accessible through convenient point-and-click routines.

This proposal supports the continued testing, validating, and developing of alongshore-current models with surfzone wave and circulation observations of 2-4 week duration at multiple field sites. The observations are used to assess model performance in different regions of the SCB, and to characterize model uncertainty. The validated model could be then applied prudently, and the results provided to users through the CDIP web site and the SCCOOS data management system. Continued model development and validation, delivery of products, and expansion of the area modeled provide the focus for this leveraging effort. COTS funds will support the analysis necessary to generate nearshore data products that resulted from the multi-agency Huntington Beach 2006 demonstration program (http://www.sccoos.org/projects/hb06/instrumentMap.php and http://cdip.ucsd.edu/hb06/).

E. Data assimilation and modeling

A major data management challenge for IOOS is the combination of sparse and inhomogeneous data into a coherent and useful picture in a regional setting. Our approach has been to support the development of a data-assimilating numerical ocean model in a collaborative effort between regional experts in this discipline located at UCLA, JPL, and SIO. Work will center on the U.S. West Coast version of ROMS, which will be used to combine observations in a dynamically consistent way and regularly produce time-dependent three-dimensional maps of velocity, temperature, salinity and basic ecosystem state (nutrients, phytoplankton, zooplankton). ROMS estimates evolutions of the ocean given observed forcing, and initial and boundary conditions. Dynamical constraints (conservation of mass, momentum, etc.) reduce errors in the result caused by uncertainty in the control parameters. If the model is accurate, the model state can in principle be brought into agreement with observations by adjusting the uncertain control parameters. The data compensate for uncertainty in the forcing, boundary, and initial conditions so that a limited amount of data can produce a higher quality estimate of the ocean when combined with a good model.

The SCCOOS approach to ocean modeling has been executed previously with NOAA and COCMP support for the West Coast version of ROMS (see Shchepetkin and McWilliams [2003]). A bightwide, 1km high resolution grid has been developed and tested for Southern California and will be deployed at JPL's regional data assimilation system to produce nowcasts and forecasts for the SCB in 2007. Model development centers at SIO and UCLA will test the model and improved data assimilation methods for the SCCOOS observations and JPL will be the center where the real-time operational ROMS data assimilation models are run.

Model improvements and methods will be transitioned to operational predictions at JPL where the results can be accessed via the SCCOOS data management system. An important task will be to estimate and improve the quality of the modeling system by looking carefully at the differences between the model fields and the observations. *This proposal continues to support data assimilation tool development, retrospective analyses designed to better the models, and data management and online model delivery tools (JPL, UCLA). The proposal also supports the development of a statistics based model of surface currents using data covariances with the goal to develop a near-realtime trajectory model available for all areas of HF radar surface current coverage (SIO).*

F. Data Management and Information Distribution

The SCCOOS data management component has the charge to integrate existing data streams with the observatory data, and distribute them for broad use. The SCCOOS WWW site serves as a portal to all SCCOOS data and that collected from other participating partners throughout the SCB. Data integration uses best practices that are in continual refinement. SCCOOS data managers participate in national dialog to ensure compliance with IOOS Data Management and Communications (DMAC) standards (Hankin/DMAC, 2003) when those are formalized.

This proposal supports the data management and web operations necessary to deliver data to both end-users, federal data federal repositories such as mooring data to NDBC, and the transmission of data to the JPL data assimilating model center.

This budget also supports web operations - a full list of available data products can be found at: http://www.sccoos.org/interactive-map/. Data integration efforts include the ingestion of CTD data from major NPDES permit holders (http://www.sccoos.org/data/cast/?r=0), shoreline water quality data from 6 different county environmental health agencies (http://www.sccoos.org/data/waterquality/) and over meteorological data from various networks of coastal sensors (http://www.sccoos.org/data/mets/). The funds also support a growing increase in data requests from users of the SCCOOS data system. In 2007-2008, time will be budgeted to participate with NOAA Coastal Services Center to evaluate, and adopt where possible, data management standards that allow for interoperability between regions.

G. Remote Sensing

Multi-sensor satellite data provide a synoptic view of ocean-surface physical and biogeochemical properties essential to assessing and predicting important fields (e.g., water quality, algal blooms). Through JPL and SIO, SCCOOS acquires, processes, and store for public use multi-parameter satellite data and imagery at the highest resolution possible. We will also work with governmental users to specify the products they require. Available products are (1) *standard* – data products (e.g., chlorophyll-a) provided by space agencies, (2) *derived* – higher-level products that utilize existing techniques (e.g., primary productivity), and (3) *information products* – derived from standard or derived products to provide integrated indicators of ecosystem health and productivity, typically of a provisional, non-calibrated nature, but of high value to agency users (e.g., spatial and temporal tracking of stormwater runoff). Some standard and derived products will be assimilated into ROMS.

These near-real-time products will be provided to NPDES permit holders, the marine safety community, and public health agencies. *This proposal supports the development of a near-realtime data access and display system which interfaces to the JPL PO.DAAC system (http://sccoos.jpl.nasa.gov/), supports the license to acquire high resolution ocean color monitor data from the Indian Space Agency (http://www.sccoos.org/interactive-map/), and new for 2007, an effort to derived qa/qc'd time series of chlorophyll and SST from regions of interest. The latter effort was identified by stakeholders as a high priority activity to allow the translation of complex remote sensing data to simple time records for boxes of interests in areas such as marine protected areas, river mouths, and coastal embayments.*

H. Education and Outreach

Coastal observing systems are a unique source of data and information to increase multi-disciplinary, inquiry-based learning both in classrooms and in informal science education centers. By virtue of the intrinsic appeal the ocean holds for students, information gathered by ocean observing systems provides an engaging context for teaching basic science concepts. Through the complimentary efforts of the California Center for Ocean Science Education Excellence (CA COSEE) at SIO and the Ocean Institute (OI) at Dana Point, SCCOOS will enhance understanding of the importance of the coastal ocean by thousands of students throughout California.

CA COSEE is a partnership of scientists and educators bringing understanding of ocean science research to a broad public and school audience. At SIO, CA COSEE is based in a public outreach facility, the Birch Aquarium where 75,000 school children visit each year. The OI is a non-profit ocean education center that hosts over 90,000 K-12 students per year through 60 field science courses aboard the vessel R/V Sea Explorer, in the 33,000 sq. ft. Ocean Education Center, in the Dana Pt. Marine Life Refuge, at Catalina Island and with the Ocean in Motion traveling classroom. Both organizations are dedicated to high quality marine science education at all grade levels.

The proposal funds SCCOOS E&O activities for two thrusts. (1) Using data gathered by the SCCOOS observatory system, CA COSEE will develop pilot instructor-designed, interactive, web-based activities for students in grades 5-12. (2) The OI will develop a model outreach and education project based on annual participation of twelve fifth-grade classes and will integrate SCCOOS products into classrooms by developing a 4-month project that engages students in current research. Both parts of this project will assist students and teachers in meeting National and California Science Content Standards in Earth and Physical Sciences. With the successful pilot of the 5th grade science program in Orange County schools, 2007 funds will support expansion of the project to the Santa Barbara region. An E&O working group of all ocean science based E&O groups in the region has been established facilitate the 2-way flow of information and identify areas for collaboration.

SCCOOS is also engaging both Sea Grant Institutions within the region to develop mechanisms for feedback exchange between observatory product development and Sea Grant field agents who already have a broad network of potential observatory users. These agents will have the opportunity to interface with the product development and data management teams. Support for the latter has been requested as part of an expanded outreach/RA development grant.

APPENDIX F

Governance Framework and Descriptions

SCCOOS GOVERNANCE

SCCOOS Board of Directors

- Phil Bailey, *Dean of the College of Science and Mathematics, Cal Poly, San Luis Obispo*
- Diane Evans, *Earth Science and Technology Directorate, Jet Propulsion Laboratory, NASA*
- Steve Gaines, *Director, Marine Science Institute, UC Santa Barbara*
- Guadalupe Garcia, *Vicerector, UABC*
- *Javier Mendieta, Director General, CICESE*
- Tony Michaels, *Director of the Wrigley Institute for Environmental Studies, University of Southern California*
- Mary Nichols, *UC Los Angeles*
- John A. Orcutt, *Deputy Director, Scripps Institution of Oceanography*
- William H. Parker, *Vice Chancellor for Research, UC Irvine*
- Carlos Robles, *CEA-CREST Program Director, Cal State Los Angeles*
- Keith Stolzenbach, *Director, Coastal Center, Institute of the Environment, UC Los Angeles*
- Steve Weisberg, *Southern California Coastal Water Research Project Authority*

Executive Steering Committee

- Russ Davis, *Scripps Institution of Oceanography*
- Yi Chao, *Jet Propulsion Laboratory, NASA*
- Burt Jones, *University of Southern California*
- Libe Washburn, *UC Santa Barbara*
- Keith Stolzenbach, *UC Los Angeles*

Board Executive Committee

- John Orcutt, *Scripps Institution of Oceanography*
- Tony Michaels, *University of Southern California*
- Mary Nichols, *UC Los Angeles*
- Steve Weisberg, *Southern California Coastal Water Research Project Authority*

Senior Advisory Committee

- Brian Aldrich, *US Coast Guard*
- Jeff Crooks, *Tijuana National Estuarine Research Reserve*
- Chris Crompton, *Southern California Stormwater Monitoring Coalition*
- Linda Duguay, *USC Seagrant*
- Leslie Ewing, *State Coastal Commission*
- Roberto Garcia, *USN METOC*
- Dominic Gregario, *State Water Resources Control Board*
- Larry Honeybourne, *Orange County Health Care Agency*
- Samuel Johnson, *US Geological Survey*
- Captain Richard McKenna, *Marine Exchange of Southern California*
- Russ Moll, *California Seagrant*
- George Robertson, *Central Bight Water Quality Working Group*
- Walter Nordhausen, *California Oil Spill Prevention and Response*
- Dave Panzer, Minerals Management Services
- Jonathan Phinney, *NOAA Southwest Fisheries/PacOOS*
- Arthur Shak, *US Army Corps of Engineers*
- Sam Shuchat, *State Coastal Conservancy*
- Rebecca Smyth, *NOAA*

Operations

- Chief Operating Officer: Eric Terrill, Scripps Institution of Oceanography

GOVERNANCE DESCRIPTIONS

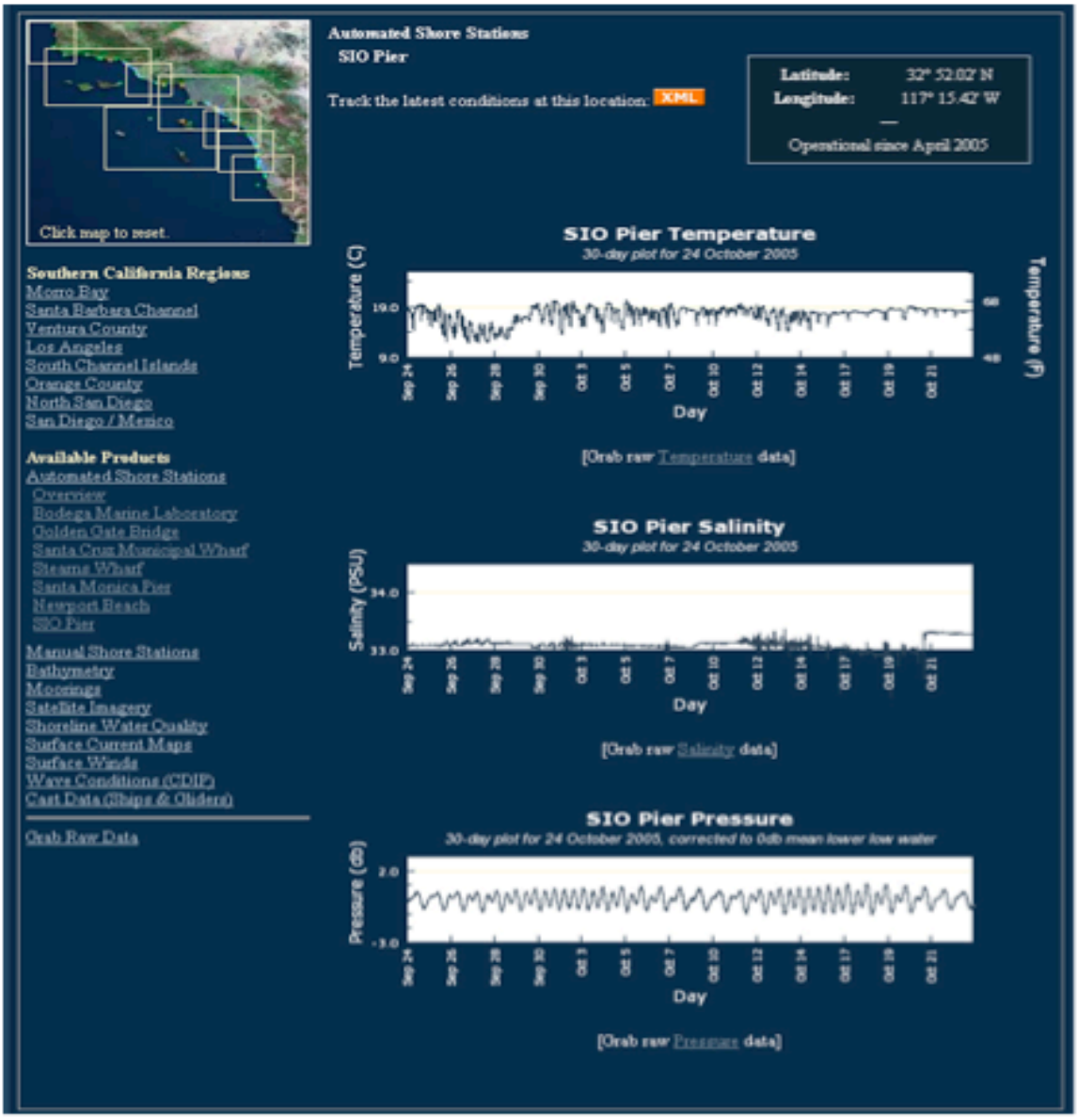
The *Board of Governors* (BOG) is comprised of the eleven signatories to the SCCOOS Memorandum of Understanding (MOU). The BOG creates positions, elected officers and fills advisory seats, including the Chairman of the BOG, and members of the Board Executive Committee (BEC), the Executive Steering Committee (ESC), the Senior Advisory Committee (SAC), and the Chief Operating Officer (COO). The BOG, with the advice of the BEC and ESC, makes all business decisions concerning SCCOOS management and operation with a commitment to the system's mission and longevity. The BOG also resolves any conflict arising from contract or agreement between consortium members or its representatives.

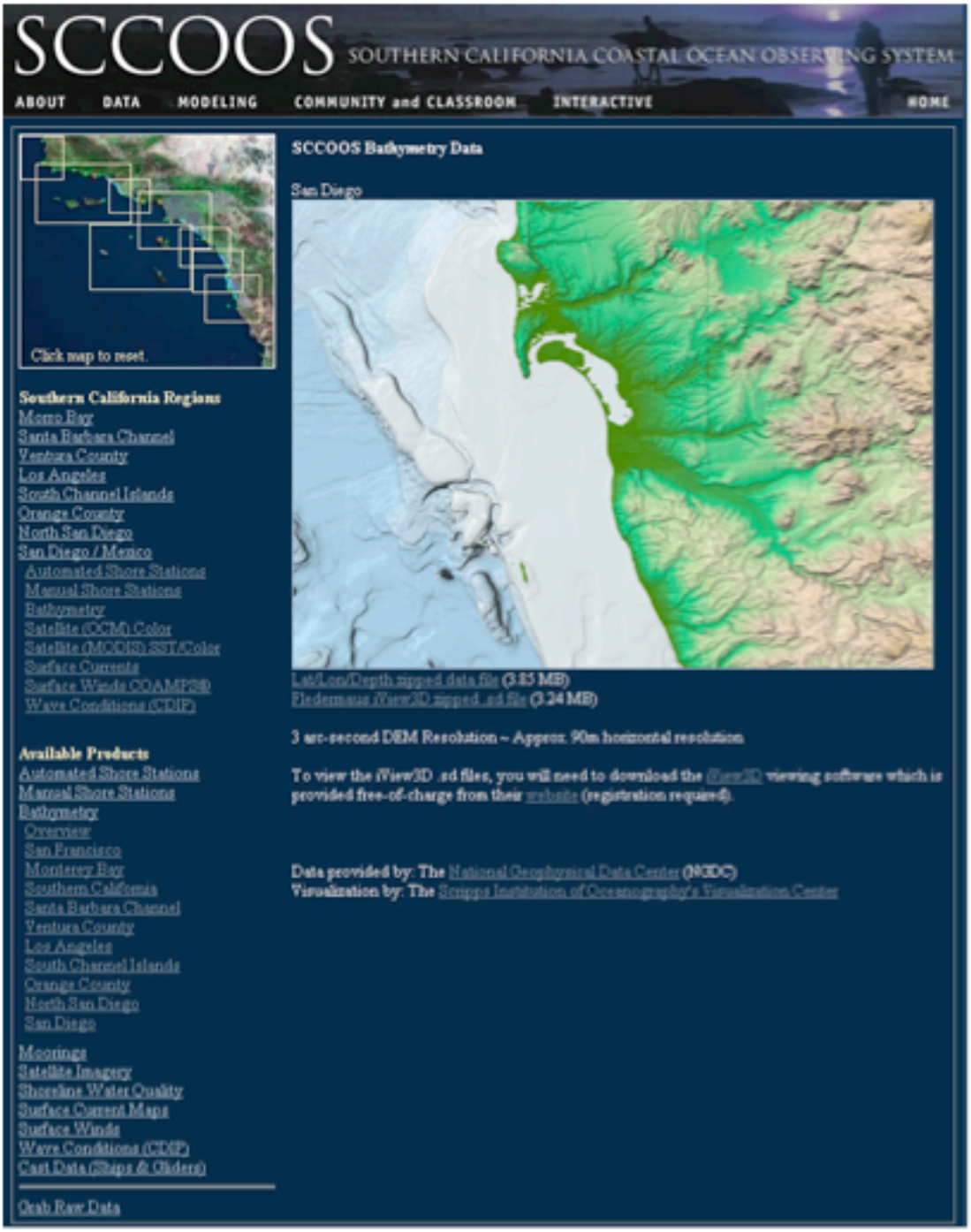
The *Executive Steering Committee* (ESC) role is to appoint an operating staff to manage the day-to-day functions of SCCOOS; convene an advisory group of users and funders; coordinate government relations and mobilize support for appropriations; plan and carry out a retreat to develop a 10-year vision for SCCOOS; establish formal and informal mechanisms to assure the greatest possible communication among members; and encourage and facilitate participation by members in SCCOOS activities,

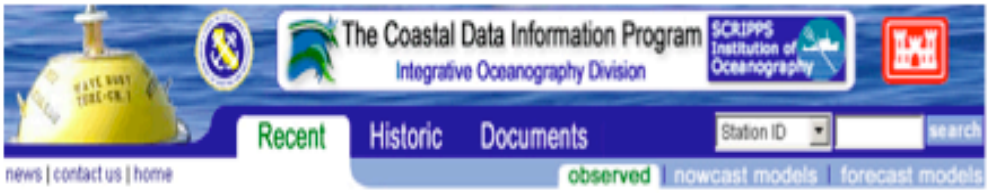
The *Senior Advisory Committee* (SAC) serves in a guidance and advisory role to provide the BOG and ESC with insight and perspective on technical, market, legislative and political matters affecting SCCOOS. SAC members are representatives of federal, state, and regional agencies and working groups. The SAC provide a means for stakeholders to provide guidance to existing SCCOOS operations and participate in strategic planning efforts. The SAC communicates and interacts with the BOG, BEC, and ESC, and serves as an outside source of information and reference that links SCCOOS with the broad stakeholder interests and knowledge within the region. The SAC shares perspectives, mission objectives, regional priorities, strategies and design ideas for all aspects of the ocean observing system to foster cohesion of stakeholders' needs and to promote a unified system at both the regional and national levels.

APPENDIX G

Examples of Web-based Products


Click map to reset.
Automated Shore Stations
SIO Pier
Track the latest conditions at this location: XML
Latitude: 32° 52.02' N
Longitude: 117° 15.42' W
Operational since April 2005
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Available Products
Automated Shore Stations
Overview
Bodega Marine Laboratory
Golden Gate Bridge
Santa Cruz Municipal Wharf
Stearns Wharf
Santa Monica Pier
Newport Beach
SIO Pier
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
Shoreline Water Quality
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
SIO Pier Temperature
30-day plot for 24 October 2005
Temperature (C)
Temperature (F)
Day
[Grab raw Temperature data]
SIO Pier Salinity
30-day plot for 24 October 2005
Salinity (PSU)
Day
[Grab raw Salinity data]
SIO Pier Pressure
30-day plot for 24 October 2005, corrected to 0db mean lower low water
Pressure (db)
Day
[Grab raw Pressure data]

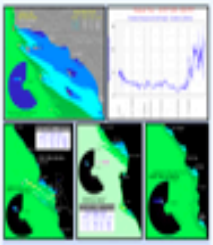

SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT
DATA
MODELING
COMMUNITY and CLASSROOM
INTERACTIVE
HOME
Click map to reset.
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Automated Shore Stations
Manual Shore Stations
Bathymetry
Satellite (OCM) Color
Satellite (MODIS) SST/Color
Surface Currents
Surface Winds (COAMPS®)
Wave Conditions (CDIP)
Available Products
Automated Shore Stations
Manual Shore Stations
Bathymetry
Overview
San Francisco
Monterey Bay
Southern California
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego
Moorings
Satellite Imagery
Shoreline Water Quality
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
SCCOOS Bathymetry Data
San Diego
Lat/Lon/Depth zipped data file (3.85 MB)
Fledermaus iView3D zipped .sd file (3.24 MB)
3 arc-second DEM Resolution ~ Approx. 90m horizontal resolution
To view the iView3D .sd files, you will need to download the iView3D viewing software which is provided free-of-charge from their website (registration required).
Data provided by: The National Geophysical Data Center (NGDC)
Visualization by: The Scripps Institution of Oceanography's Visualization Center



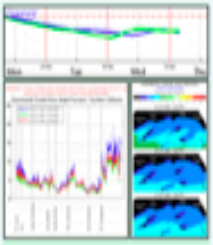
CDIP Recent Data

Summary Tables
9-Band
Parameter
Summary Maps
South CA: 9-Band
South CA: Parameter

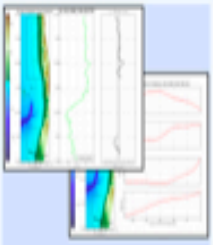
Descriptions/Help
Location list
Region Maps



Latest Nowcast Models
Updated: Mon, 17:35 UTC



Latest Forecast Models
Updated: Mon, 13:22 UTC



Latest Nearshore Models
Updated: Mon, 17:29 UTC

9-Band Summary Table

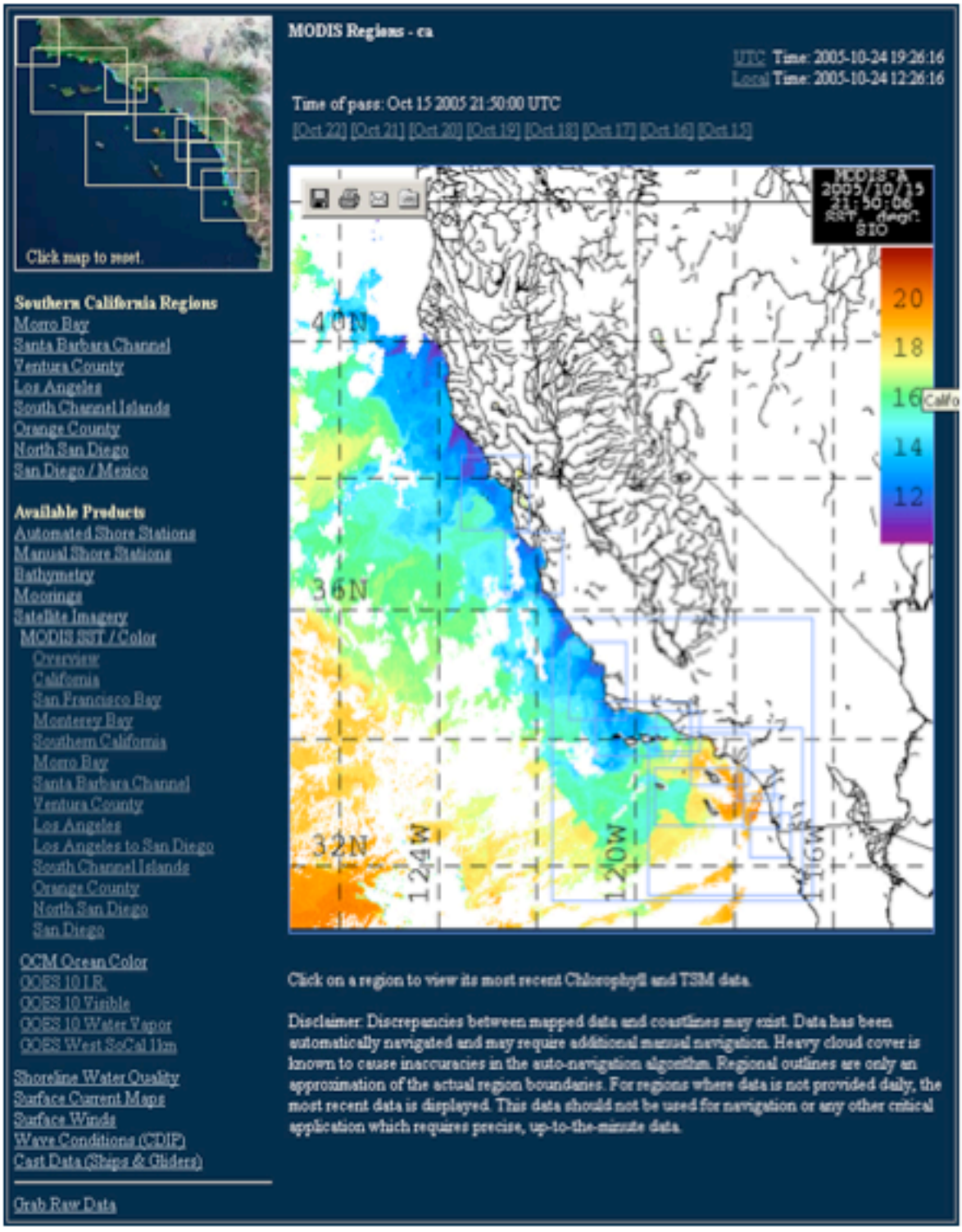
Units: metric | Timezone: UTC | update

Click any station for more details; data more than 3 hours old in red

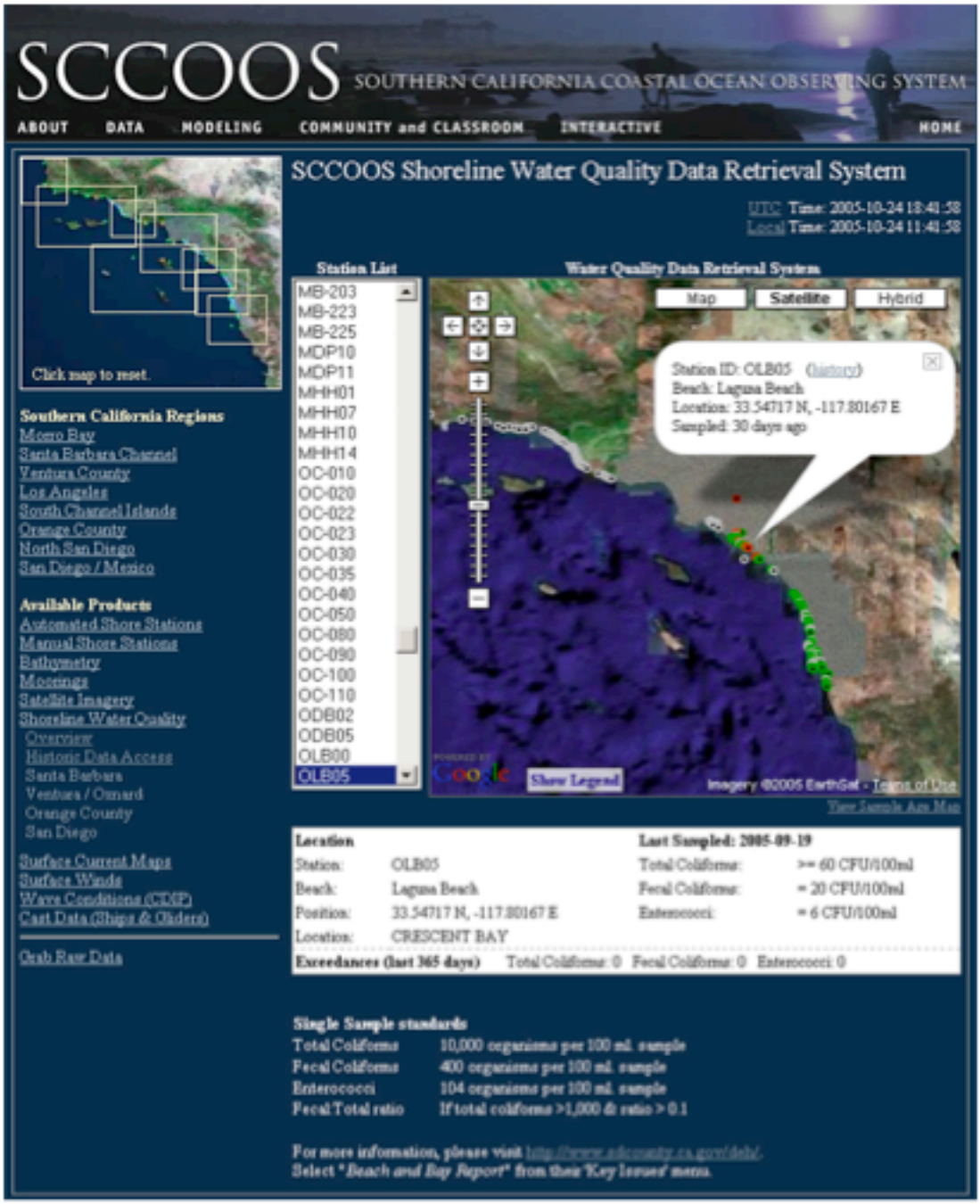
Hs: Significant wave height Tp: Peak period Dp: Peak direction SST: Sea surface temperature

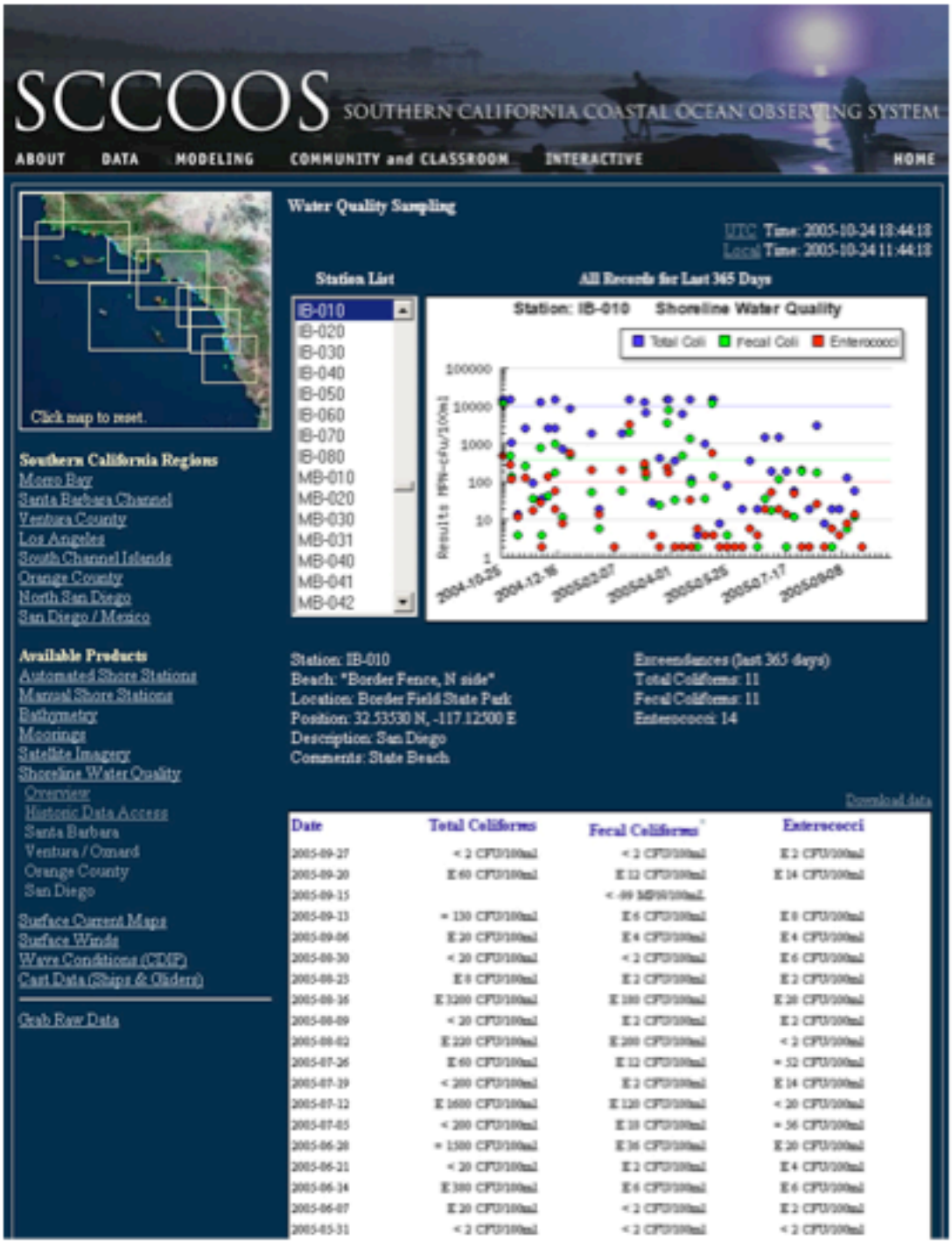
WAVES AND SEA SURFACE TEMPS		Date	Time	Hs	Tp	Dp	SST
Stn #	Station Name	(m/d)	(UTC)	(m)	(s)	(deg)	(C)
098	MOKAPU POINT, HI	10/24	17:24	2.73	11	9	26.4
106	WAIMEA BAY, HI	10/24	17:27	2.72	9	16	25.7
093	MISSION BAY, CA	10/24	17:30	1.59	15	260	18.3
073	SCRIPPS PIER, LA JOLLA CA	10/24	16:45	0.88	13		
100	TORREY PINES OUTER, CA	10/24	17:29	1.18	15	238	18.8
045	OCEANSIDE OFFSHORE, CA	10/24	17:04	1.18	15	208	18.5
067	SAN NICOLAS ISLAND, CA	10/24	17:30	2.52	15	292	15.6
096	DANA POINT, CA	10/24	17:28	0.98	15	208	17.9
092	SAN PEDRO, CA	10/24	17:28	0.95	15	244	18.4
172	HUNTINGTON BEACH NEARSHORE, CA	10/24	17:30	0.89	15	182	16.9
028	SANTA MONICA BAY, CA	10/24	17:16	1.03	15	211	17.5
111	ANACAPA PASSAGE, CA	10/24	17:31	1.45	11	274	16.5
107	GOLETA POINT, CA	10/24	17:27	1.25	15	267	16.5
131	RINCON NEARSHORE, CA	10/24	17:28	0.69	13	230	16.7
076	DIABLO CANYON, CA	10/24	17:13	2.33	15	268	12.9
029	POINT REYES, CA	10/24	17:28	3.48	13	298	12.4
094	CAPE MENDOCINO, CA	10/24	17:25	3.30	13	302	13.0
128	HUMBOLDT BAY SOUTH SPIT, CA	10/24	15:55	2.61	13	299	11.4
126	COOS BAY, OR	10/24	17:29	2.70	13	301	13.6
036	GRAYS HARBOR, WA	10/24	17:31	2.43	13	286	13.4
083	KINGS BAY, GA	10/24	17:29	1.31	4	40	
121	IPAN, GUAM	10/24	17:31	1.64	4	92	29.5

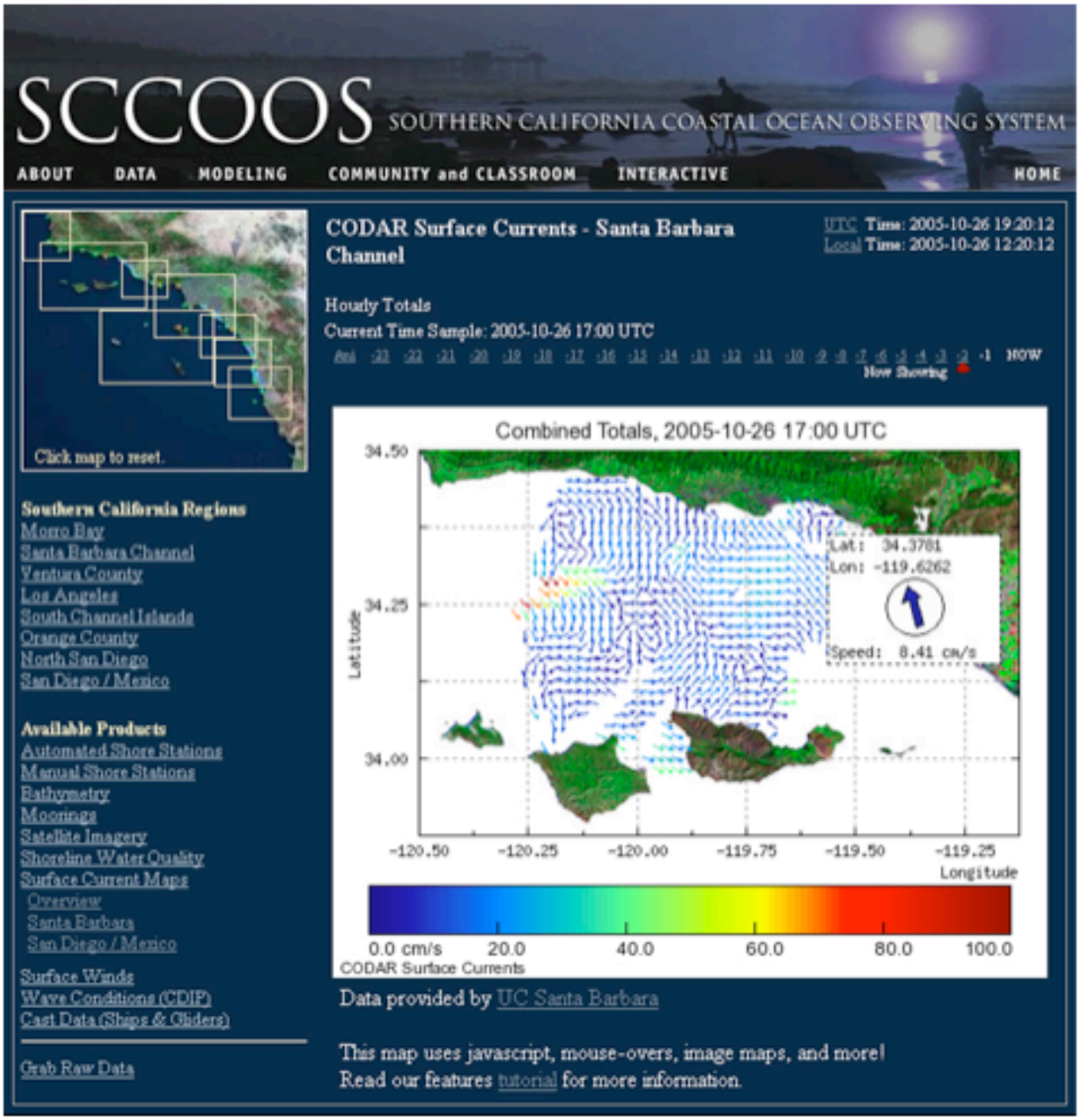
WINDS AND AIR TEMPERATURES		Date	Time	Speed (m/s)		Dir (deg)	Air
Stn #	Station Name	(m/d)	(UTC)	Avg	Peak	Avg	(C)
073	SCRIPPS PIER, LA JOLLA CA	10/24	16:45	3.56	4.70	260	15.9


MODIS Regions - ca
UTC Time: 2005-10-24 19:26:16
Local Time: 2005-10-24 12:26:16
Time of pass: Oct 15 2005 21:50:00 UTC
[Oct 22] [Oct 21] [Oct 20] [Oct 19] [Oct 18] [Oct 17] [Oct 16] [Oct 15]
Click map to reset.
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Available Products
Automated Shore Stations
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
MODIS SST / Color
Overview
California
San Francisco Bay
Monterey Bay
Southern California
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
Los Angeles to San Diego
South Channel Islands
Orange County
North San Diego
San Diego
OCM Ocean Color
GOES 10 I.R.
GOES 10 Visible
GOES 10 Water Vapor
GOES West SoCal 11m
Shoreline Water Quality
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
MODIS - A
2005/10/15
21:50:00
SST deg C
SIO
20
18
16
14
12
40N
36N
32N
124W
120W
116W
Click on a region to view its most recent Chlorophyll and TSM data.
Disclaimer: Discrepancies between mapped data and coastlines may exist. Data has been automatically navigated and may require additional manual navigation. Heavy cloud cover is known to cause inaccuracies in the auto-navigation algorithm. Regional outlines are only an approximation of the actual region boundaries. For regions where data is not provided daily, the most recent data is displayed. This data should not be used for navigation or any other critical application which requires precise, up-to-the-minute data.


SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT
DATA
MODELING
COMMUNITY and CLASSROOM
INTERACTIVE
HOME
Click map to reset.
Hourly Satellite Images
UTC Time: 2005-10-24 18:35:33
Local Time: 2005-10-24 11:35:33
GOES 10 I.R.
GOES 10 Visible
GOES 10 Water Vapor
GOES West SoCal 1km
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Available Products
Automated Shore Stations
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
MODIS SST / Color
OCM Ocean Color
GOES 10 I.R.
GOES 10 Visible
GOES 10 Water Vapor
GOES West SoCal 1km
Shoreline Water Quality
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data


SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT
DATA
MODELING
COMMUNITY and CLASSROOM
INTERACTIVE
HOME
SCCOOS Shoreline Water Quality Data Retrieval System
UTC Time: 2005-10-24 18:41:58
Local Time: 2005-10-24 11:41:58
Click map to reset.
Station List
Water Quality Data Retrieval System
Map
Satellite
Hybrid
Station ID: OLB05 (history)
Beach: Laguna Beach
Location: 33.54717 N, -117.80167 E
Sampled: 30 days ago
MB-203
MB-223
MB-225
MDP10
MDP11
MHH01
MHH07
MHH10
MHH14
OC-010
OC-020
OC-022
OC-023
OC-030
OC-035
OC-040
OC-050
OC-080
OC-090
OC-100
OC-110
ODB02
ODB05
OLB00
OLB05
Show Legend
Imagery ©2005 EarthSat - Terms of Use
View Sample Age Map
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Available Products
Automated Shore Stations
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
Shoreline Water Quality
Overview
Historic Data Access
Santa Barbara
Ventura / Oxnard
Orange County
San Diego
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
Location
Station: OLB05
Beach: Laguna Beach
Position: 33.54717 N, -117.80167 E
Location: CRESCENT BAY
Last Sampled: 2005-09-19
Total Coliforms: >= 60 CFU/100ml
Fecal Coliforms: = 20 CFU/100ml
Enterococci: = 6 CFU/100ml
Exceedances (last 365 days) Total Coliforms: 0 Fecal Coliforms: 0 Enterococci: 0
Single Sample standards
Total Coliforms 10,000 organisms per 100 ml. sample
Fecal Coliforms 400 organisms per 100 ml. sample
Enterococci 104 organisms per 100 ml. sample
Fecal:Total ratio If total coliforms >1,000 & ratio > 0.1
For more information, please visit http://www.sdcounty.ca.gov/deh/.
Select "Beach and Bay Report" from their "Key Issues" menu.


SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT
DATA
MODELING
COMMUNITY and CLASSROOM
INTERACTIVE
HOME
Click map to meet.
Water Quality Sampling
UTC Time: 2005-10-24 18:44:18
Local Time: 2005-10-24 11:44:18
Station List
All Records for Last 365 Days
IB-010
IB-020
IB-030
IB-040
IB-050
IB-060
IB-070
IB-080
MB-010
MB-020
MB-030
MB-031
MB-040
MB-041
MB-042
Station: IB-010 Shoreline Water Quality
Total Coli
Fecal Coli
Enterococci
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
San Diego / Mexico
Available Products
Automated Shore Stations
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
Shoreline Water Quality
Overview
Historic Data Access
Santa Barbara
Ventura / Oxnard
Orange County
San Diego
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
Station: IB-010
Beach: "Border Fence, N side"
Location: Border Field State Park
Position: 32.53530 N, -117.12500 E
Description: San Diego
Comments: State Beach
Exceedances (last 365 days)
Total Coliforms: 11
Fecal Coliforms: 11
Enterococci: 14
Download data
Date
Total Coliforms
Fecal Coliforms
Enterococci


SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT DATA MODELING COMMUNITY and CLASSROOM INTERACTIVE HOME
Click map to reset.
Southern California Regions
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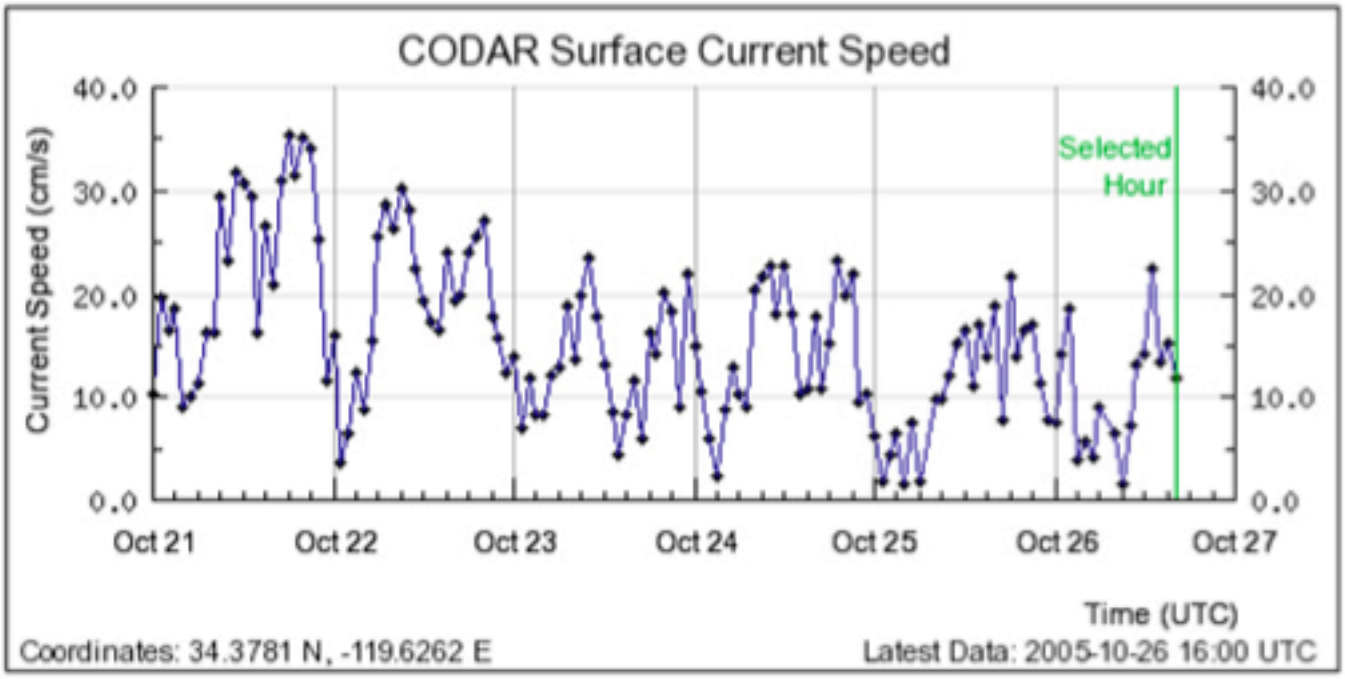
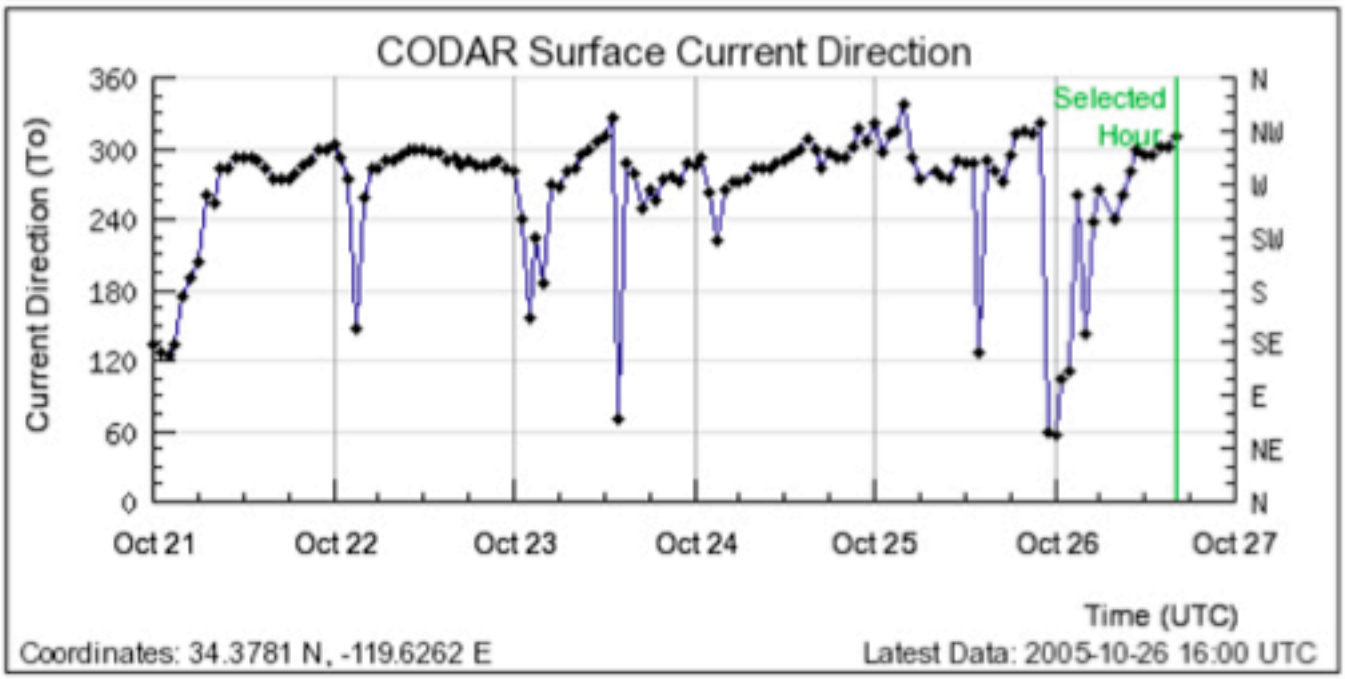
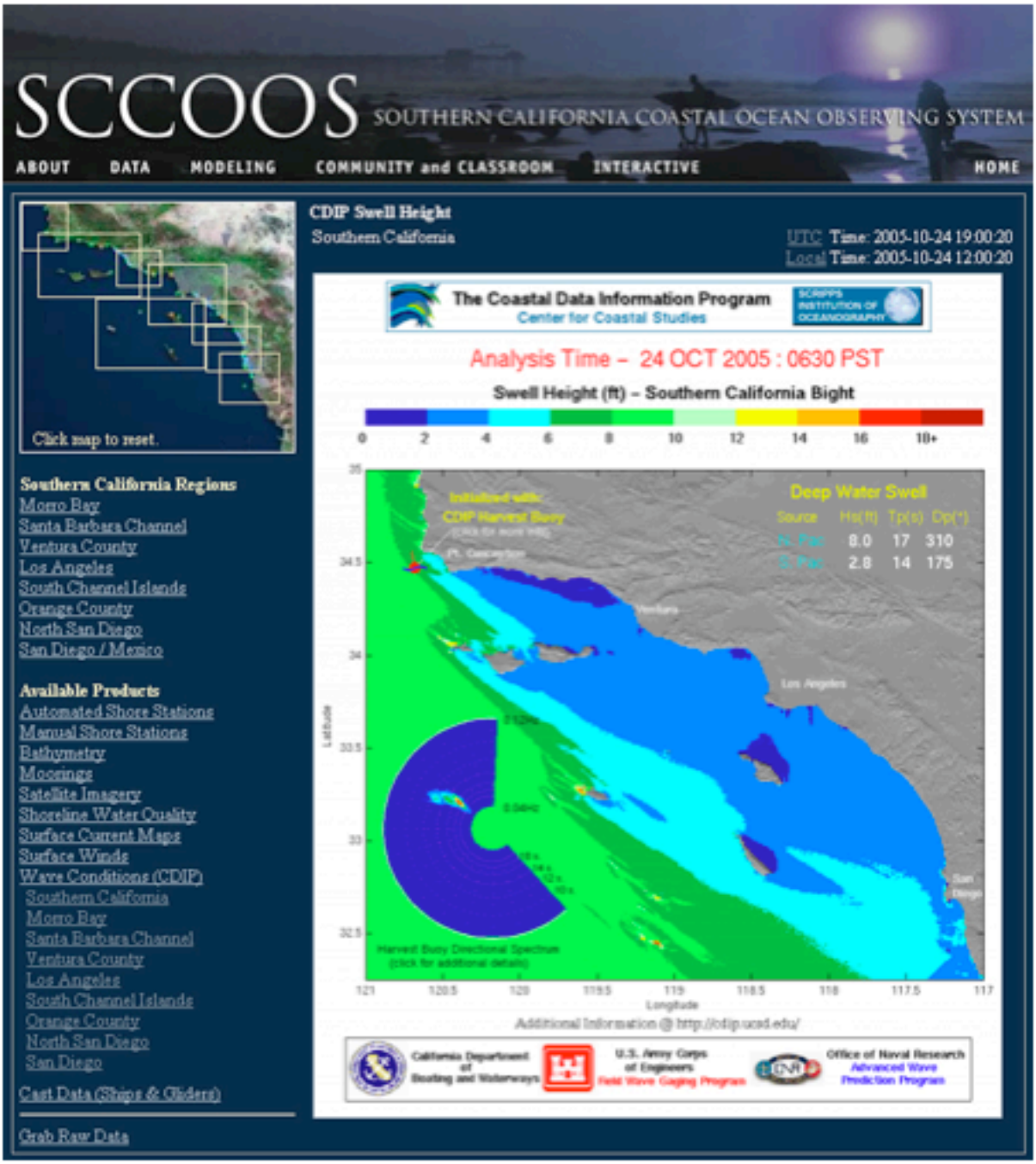
Shoreline Water Quality
Surface Current Maps
Overview
Santa Barbara
San Diego / Mexico
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
Grab Raw Data
CODAR Surface Currents - Santa Barbara Channel
UTC Time: 2005-10-26 19:20:12
Local Time: 2005-10-26 12:20:12
Hourly Totals
Current Time Sample: 2005-10-26 17:00 UTC
-1 NOW
Now Showing
Combined Totals, 2005-10-26 17:00 UTC
34.50
34.25
34.00
Latitude
Lat: 34.3781
Lon: -119.6262
Speed: 8.41 cm/s
-120.50
-120.25
-120.00
-119.75
-119.50
-119.25
Longitude
0.0 cm/s
20.0
40.0
60.0
80.0
100.0
CODAR Surface Currents
Data provided by UC Santa Barbara
This map uses javascript, mouse-overs, image maps, and more!
Read our features tutorial for more information.


CODAR Surface Current Speed
Current Speed (cm/s)
40.0
30.0
20.0
10.0
0.0
Selected Hour
Oct 21
Oct 22
Oct 23
Oct 24
Oct 25
Oct 26
Oct 27
Time (UTC)
Coordinates: 34.3781 N, -119.6262 E
Latest Data: 2005-10-26 16:00 UTC


CODAR Surface Current Direction
Current Direction (To)
360
300
240
180
120
60
0
N
NW
W
SW
S
SE
E
NE
N
Selected Hour
Oct 21
Oct 22
Oct 23
Oct 24
Oct 25
Oct 26
Oct 27
Time (UTC)
Coordinates: 34.3781 N, -119.6262 E
Latest Data: 2005-10-26 16:00 UTC


SCCOOS
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM
ABOUT
DATA
MODELING
COMMUNITY and CLASSROOM
INTERACTIVE
HOME
Click map to reset.
CDIP Swell Height
Southern California
UTC Time: 2005-10-24 19:00:20
Local Time: 2005-10-24 12:00:20
The Coastal Data Information Program
Center for Coastal Studies
SCRIPPS INSTITUTION OF OCEANOGRAPHY
Analysis Time – 24 OCT 2005 : 0630 PST
Swell Height (ft) – Southern California Bight
0
2
4
6
8
10
12
14
16
18+
Deep Water Swell
Source Hs(ft) Tp(s) Dp(°)
N. Pac 8.0 17 310
S. Pac 2.8 14 175
Initialized with:
CDIP Harvest Buoy
Ventura
Los Angeles
Latitude
Longitude
Harvest Buoy Directional Spectrum
(click for additional details)
Additional Information @ http://cdip.ucsd.edu/
California Department of Boating and Waterways
U.S. Army Corps of Engineers
Field Wave Gaging Program
Office of Naval Research
Advanced Wave Prediction Program
Southern California Regions
Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
South Channel Islands
Orange County
North San Diego
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Southern California
Morro Bay
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Ventura County
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South Channel Islands
Orange County
North San Diego
San Diego
Cast Data (Ships & Gliders)
Grab Raw Data

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

ABOUT DATA MODELING COMMUNITY and CLASSROOM INTERACTIVE HOME

Southern California Regions

Morro Bay
Santa Barbara Channel
Ventura County
Los Angeles
- Automated Shore Stations
- Manual Shore Stations
- Bathymetry
- Satellite (OCM) Color
- Satellite (MODIS) SST/Color
- Surface Winds COAMPS®
- Wave Conditions (CDIP)
- Cast Data(Ships & Gliders)

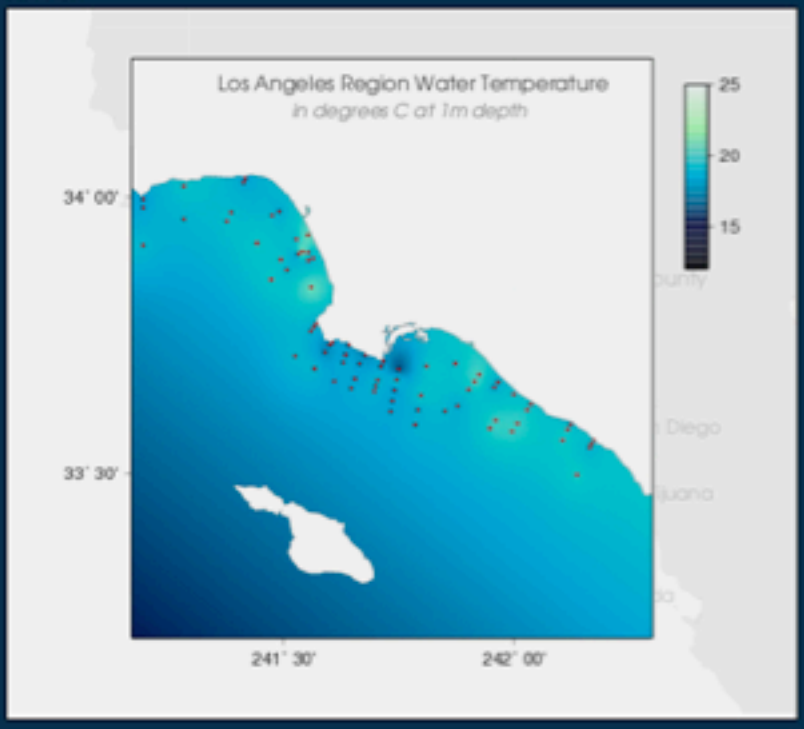
South Channel Islands
Orange County
North San Diego
San Diego / Mexico

Available Products

Automated Shore Stations
Manual Shore Stations
Bathymetry
Moorings
Satellite Imagery
Shoreline Water Quality
Surface Current Maps
Surface Winds
Wave Conditions (CDIP)
Cast Data (Ships & Gliders)
- Southern California
- Los Angeles

Grab Raw Data

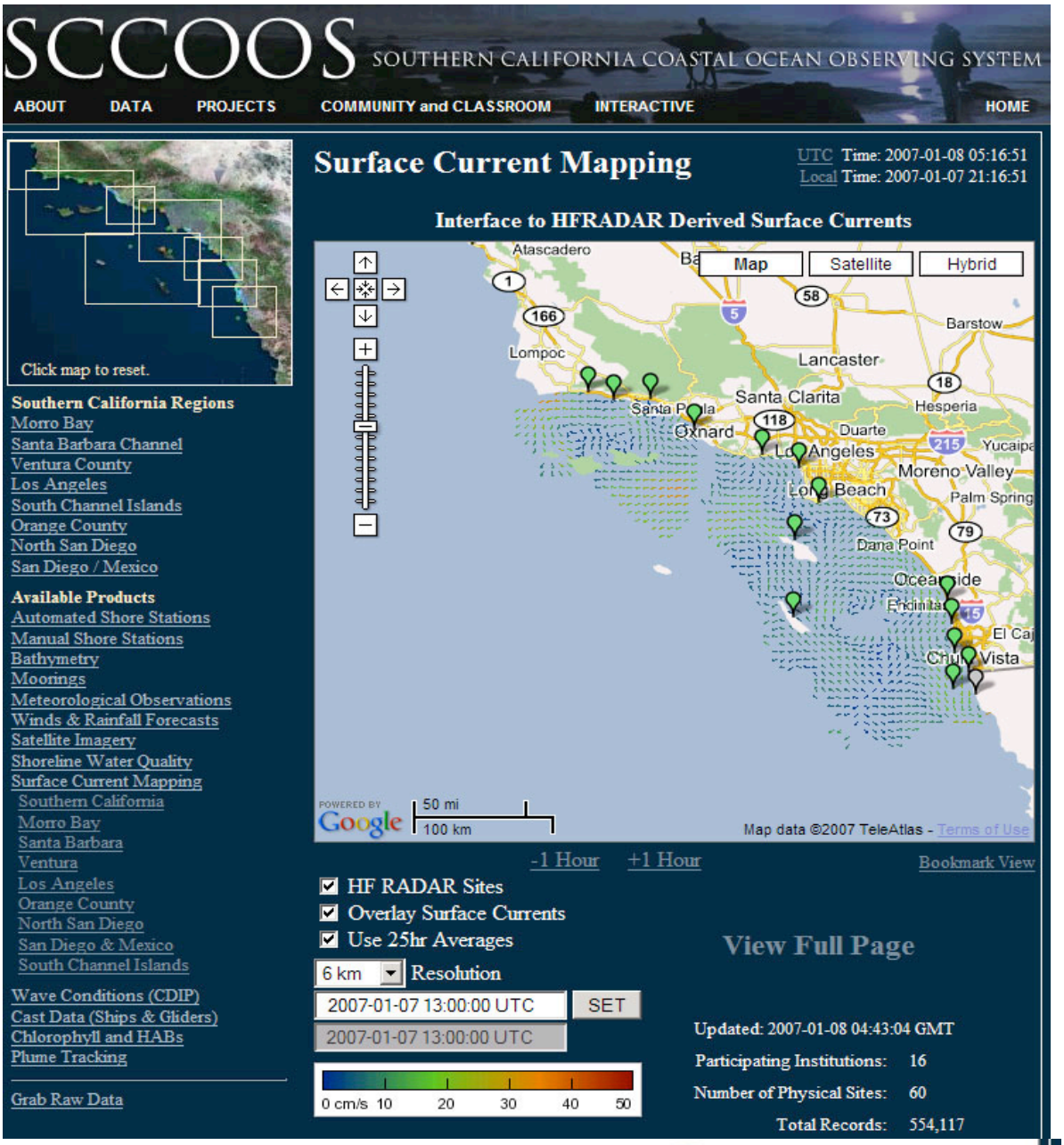
Cast Data



Click on the sites (in red) for more information.

The data for this program originates from the Central Eight Water Quality Program. This program is a collaborative program between the Orange County Sanitation District (OCSD), the County Sanitation Districts of Los Angeles County (LACSD), the City of Los Angeles Department of Sanitation (Hyperion), and ABC Labs for the City of Oxnard (Oxnard).

This program has been conducted quarterly from July 1998 through the present. All sampling is conducted using Seabird CTDs at fixed stations and using similar methods. In most cases, the entire grid is sampled in a three to four day period.



cocmp

Coastal Conservancy

Ocean current maps are a product of the Coastal Ocean Currents Monitoring Program (COCMP). The project is funded by California State Coastal Conservancy and the State Water board with resources from California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002 and the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. COCMP is managed by the California State Coastal Conservancy.

CeNCOOS

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Observing Activities | Products & Data | Coastal Conditions | News & Events | About CeNCOOS | Get Involved

Home > Surface Current Mapping

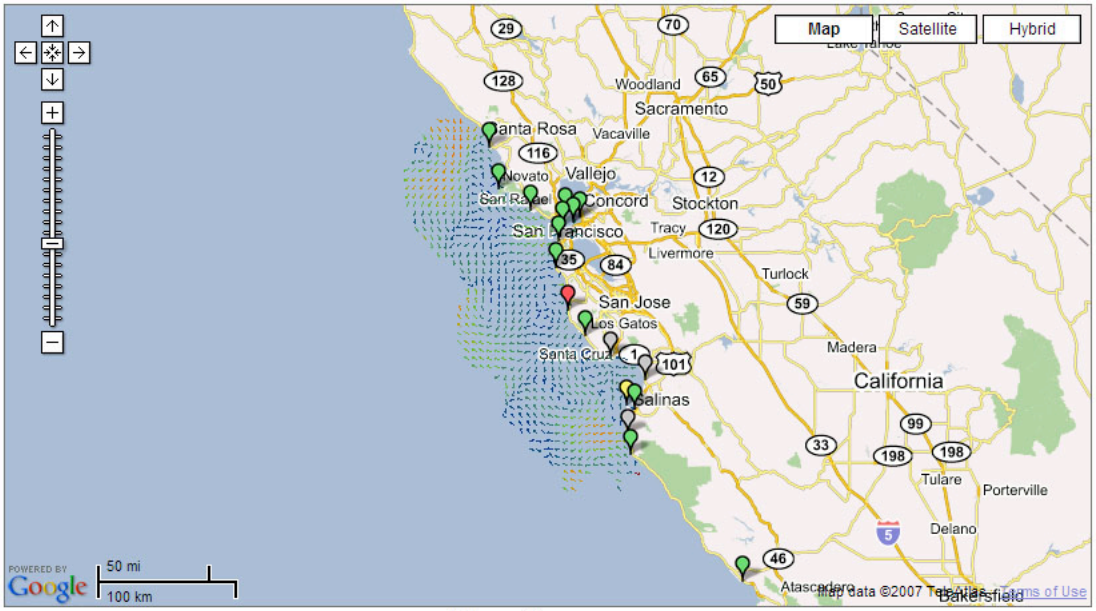
Contact Us | Council Page | Events Calendar

REGIONAL VIEW
- Bodega Bay
- San Francisco Bay
- Año Nuevo
- Monterey Bay

Product View
- Hourly Currents
- 25-hr Mean Currents
- RADAR Locations

Surface Current Mapping

Interface to HFRADAR Derived Surface Currents



-1 Hour +1 Hour

Bookmark View

- [x] HF RADAR Sites
- [x] Overlay Surface Currents
- [x] Use 25hr Averages

6 km Resolution

2007-01-09 23:00:00 UTC SET

2007-01-09 23:00:00 UTC

2007-01-09 15:00:00-0800

0 cm/s 10 20 30 40 50

View Full Page

Updated: 2007-01-10 21:25:06 GMT

Participating Institutions: 16

Number of Physical Sites: 60

Total Records: 557,883

Station status is monitored in near real-time.

There is an xml station status file that provides basic metadata for reporting stations.

Coastal Conservancy

cocmp

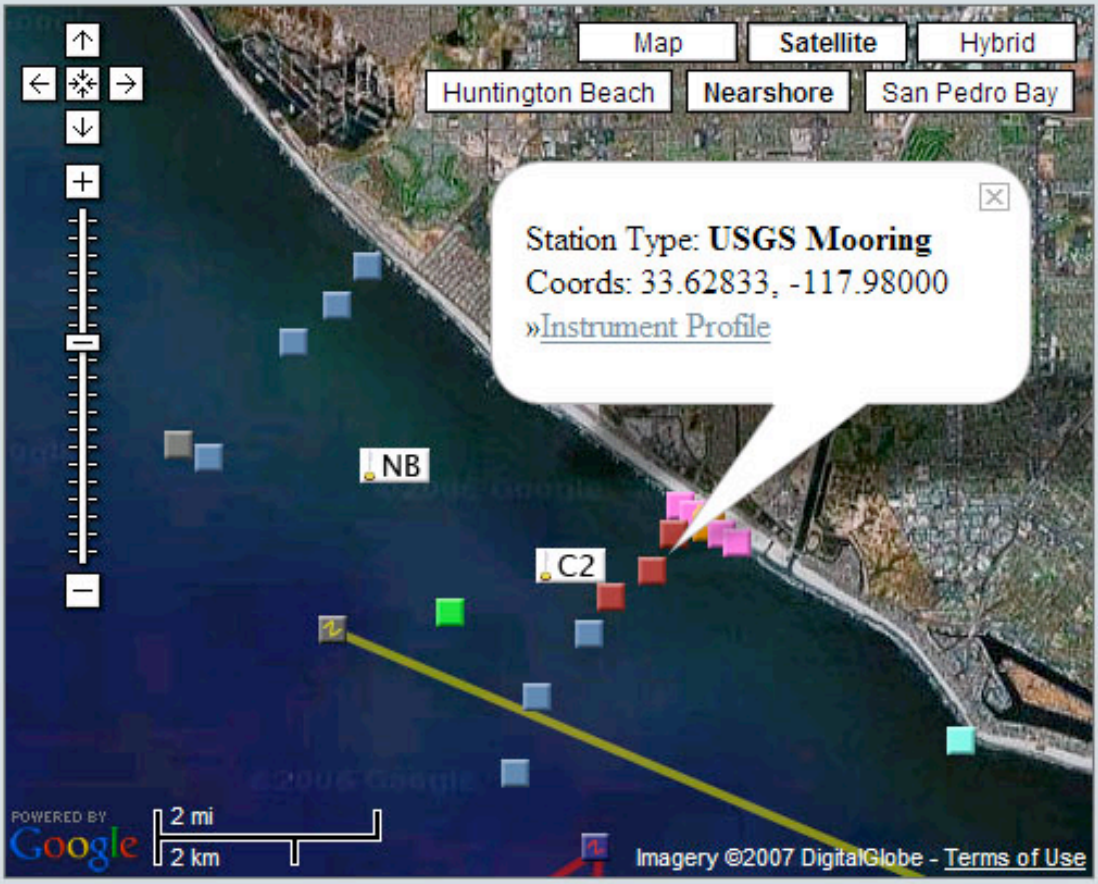
Ocean currents maps are a product of the Coastal Ocean Currents Monitoring Program (COCMP). The project is funded by the State of California from the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002 and the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002.

Huntington Beach 2006

WHERE ARE THE OBSERVATIONS?

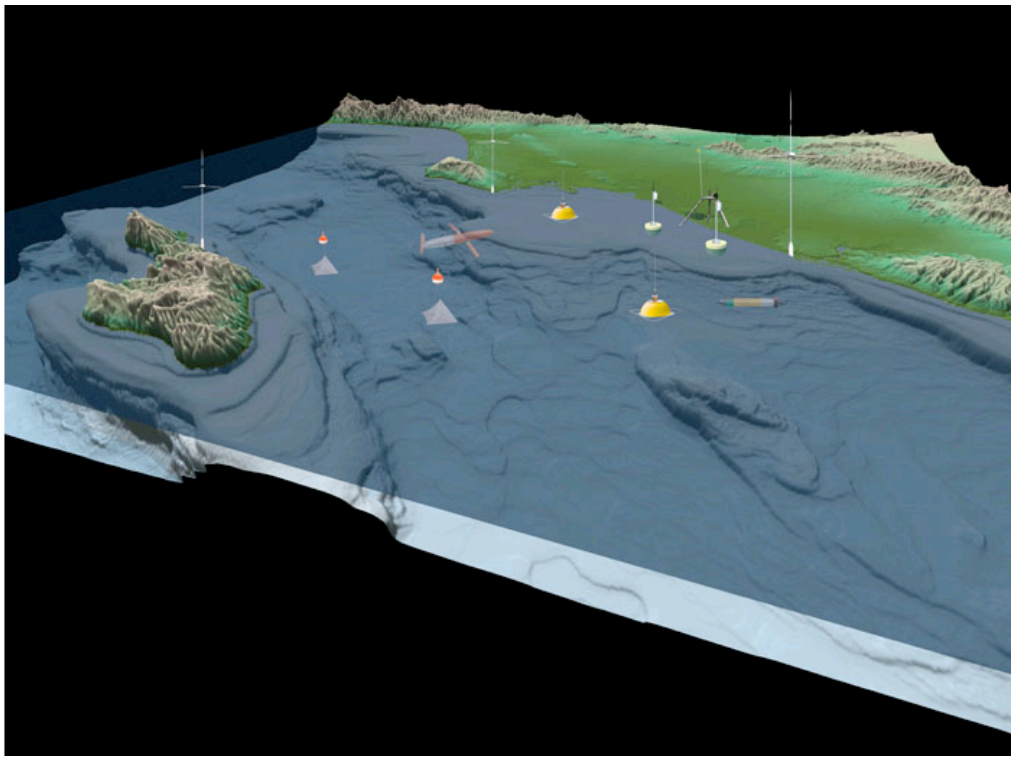
SCCOOS assets are deployed in the surfzone, nearshore, and offshore Huntington Beach.

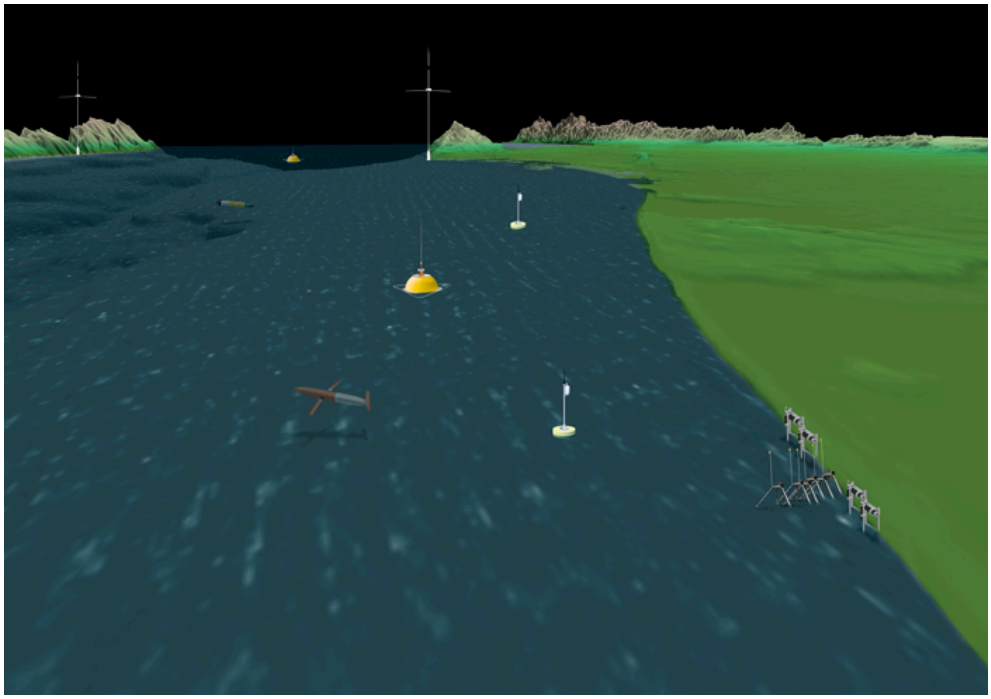
EXPLORE BELOW



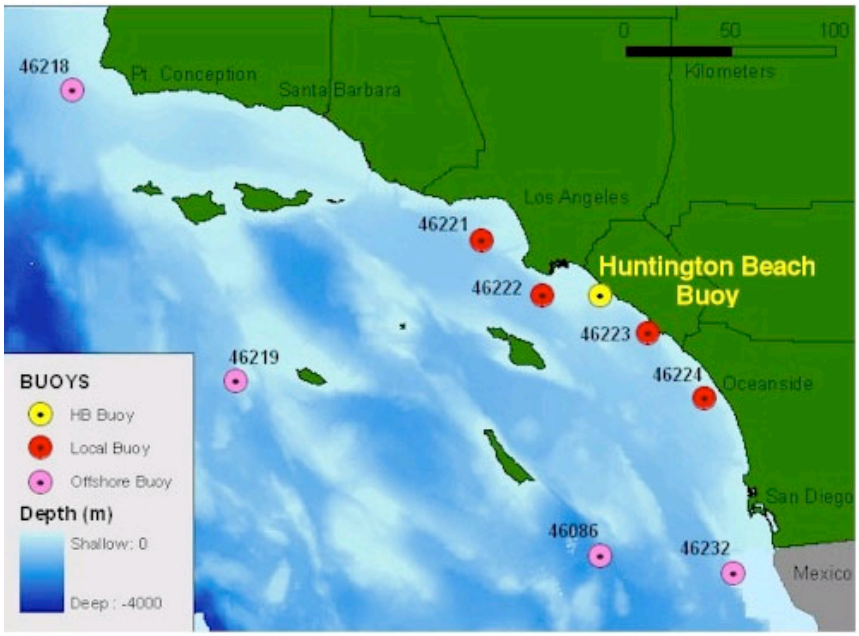
Bookmark this view

Also available: HB06 Project Calendar.





Huntington Beach Nearshore Experiment



The Huntington Beach Nearshore Experiment (HB06) will improve understanding of the processes that transport and disperse sediment, biota, and pollutants in shallow water.

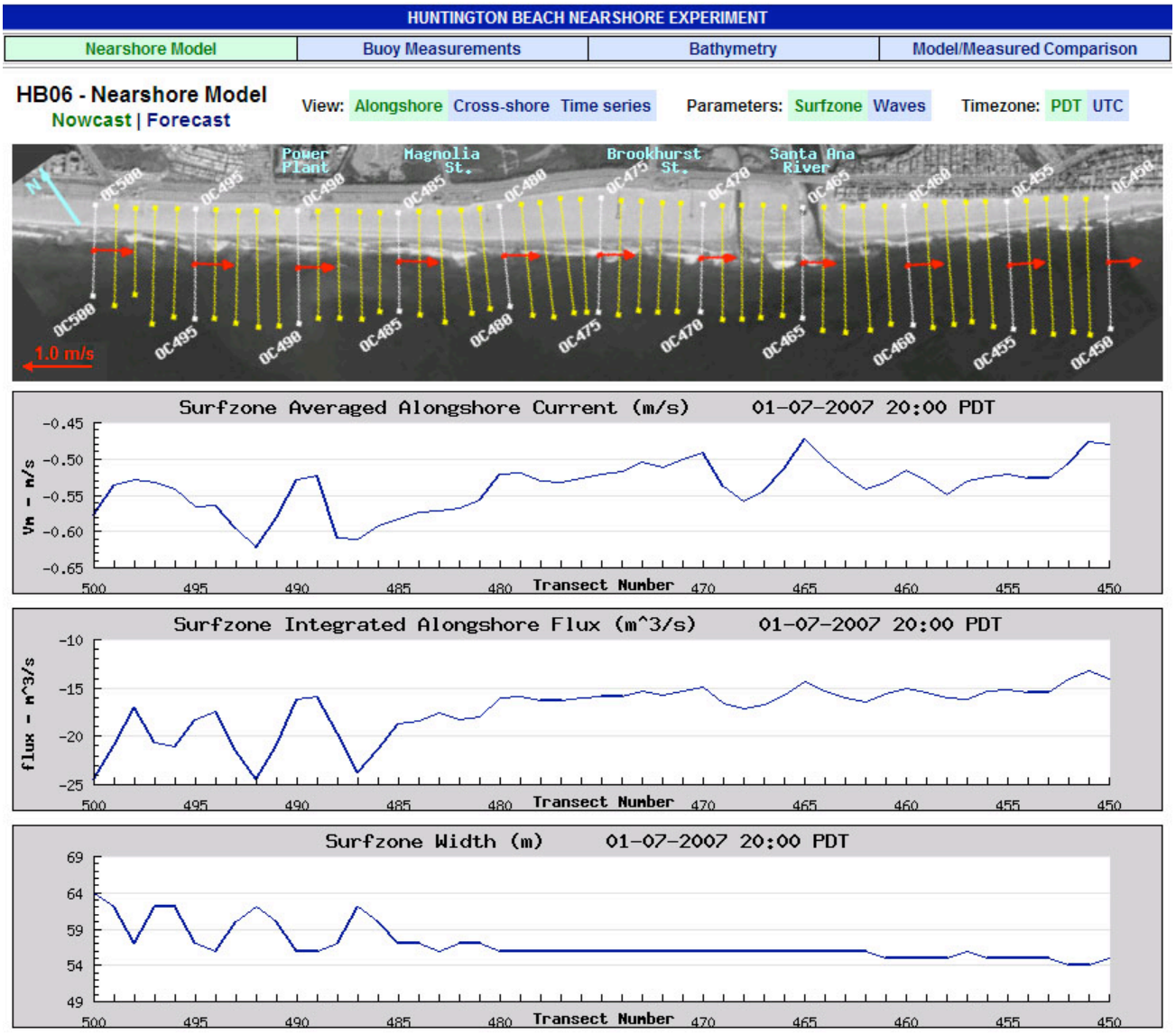
HB06 (**overview**) is a component of the Southern California Coastal Observing System (**SCCOOS**).

Waves & Beaches at HB06:
- **Overview**
- **Wave Buoy Observations**
- **Surfzone Wave & Currents**

Beach Sand Level Surveys:
- **Airborne LIDAR**
- **In-the-water**

HB06 is principally funded by: Coastal Conservancy, NOAA

with additional support from **Sea Grant, ONR, USACE, CDBW, USGS, OCSD**

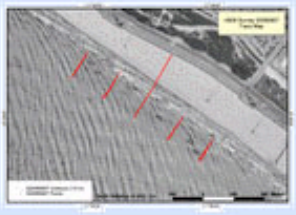
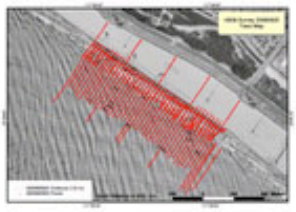
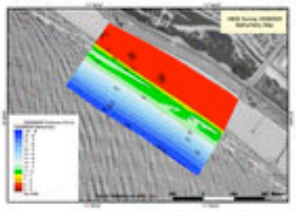
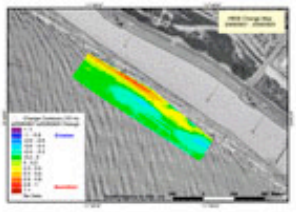
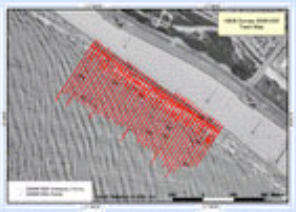
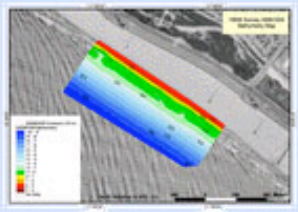
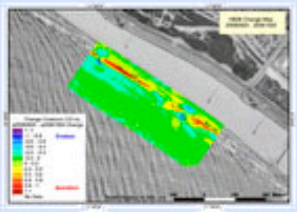
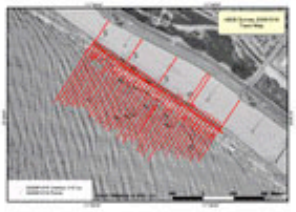
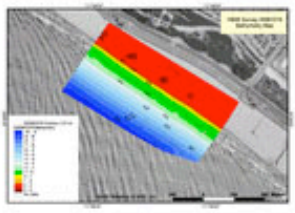
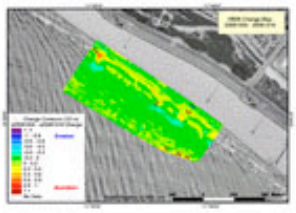

HUNTINGTON BEACH NEARSHORE EXPERIMENT
Nearshore Model
Buoy Measurements
Bathymetry
Model/Measured Comparison
HB06 - Nearshore Model
Nowcast | Forecast
View: Alongshore Cross-shore Time series
Parameters: Surfzone Waves
Timezone: PDT UTC
Power Plant
Magnolia St.
Brookhurst St.
Santa Ana River
N
1.0 m/s
Surfzone Averaged Alongshore Current (m/s) 01-07-2007 20:00 PDT
Vm - m/s
Transect Number
Surfzone Integrated Alongshore Flux (m^3/s) 01-07-2007 20:00 PDT
flux - m^3/s
Transect Number
Surfzone Width (m) 01-07-2007 20:00 PDT
Transect Number

HUNTINGTON BEACH NEARSHORE EXPERIMENT

Nearshore Model	Buoy Measurements	Bathymetry	Model/Measured Comparison

HB06 Bathymetry Measurements

SIO In-Situ	Airborne LIDAR	Multibeam Bathymetry	USACE Historical Profiles

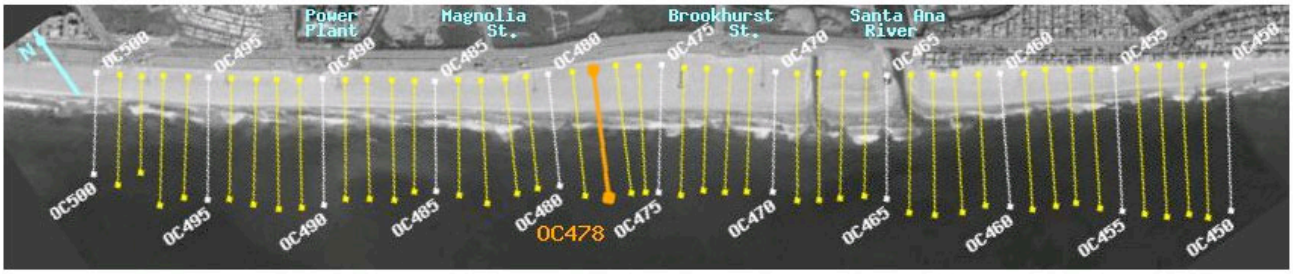
Survey Date	Tracklines	Bathymetry	Sand Level Changes
20060907		N/A	N/A
20060925			
20061005			
20061016			

HUNTINGTON BEACH NEARSHORE EXPERIMENT

Nearshore Model | Buoy Measurements | Bathymetry | Model/Measured Comparison

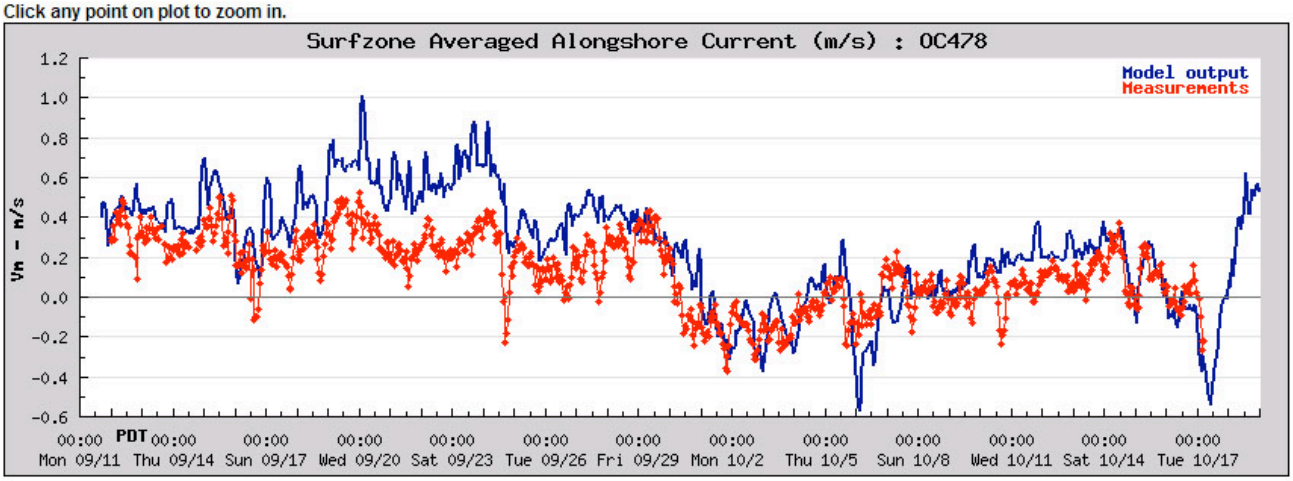
HB06 - Model/Measurement Comparison

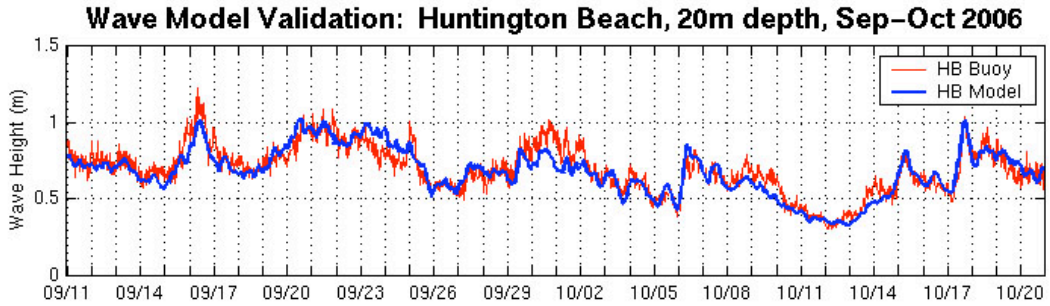
Timezone: PDT UTC



Nearshore model/field measurement comparison: 09/12-10/18 2006

Click any point on plot to zoom in.





Huntington Beach 2006

SCCOOS Projects

- Hyperion Diversion
- Huntington Beach (HB06)
  - Overview
  - Instrument Map
  - Project Calendar

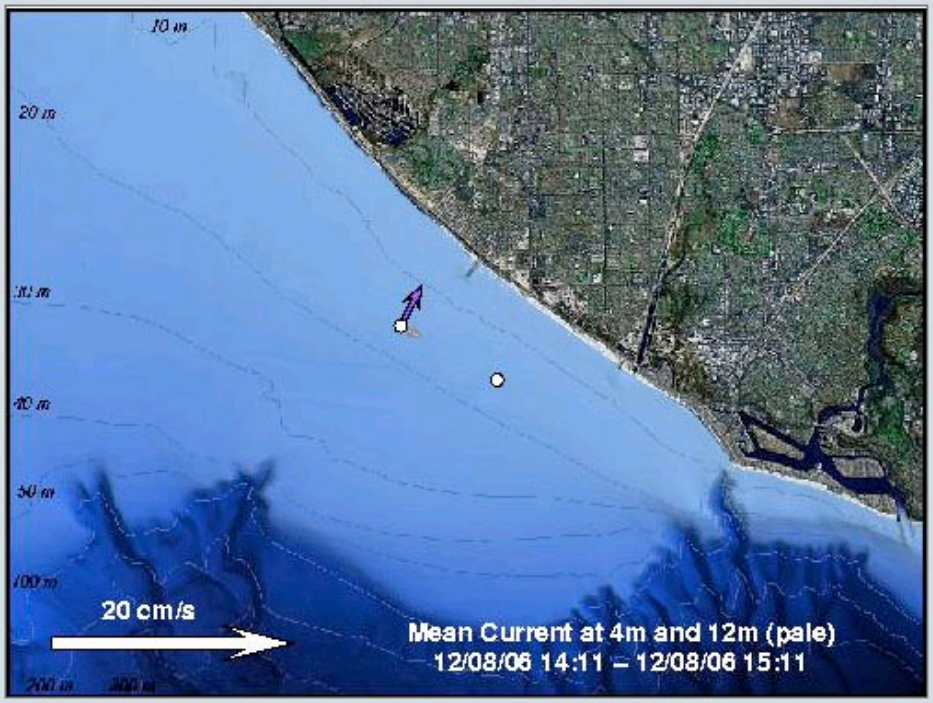
Huntington & Newport Beach

- CDIP HB06 Experiment Pages
- Surfzone Waves and Currents
- Newport Pier Shore Station
- SCCOOS Ocean Moorings
  - SIO-C2
  - SIO-NB2
- Meteorological Observations
- Water Quality Samples
- **Forecasts**
  - Winds
  - Precipitation
  - NWS Weather Forecast

Greater San Pedro Bay Region

- CalPoly REMUS AUVs
- Rutgers Inshore Gliders
- UCSB Ocean Drifters
- Scripps Ocean Gliders
- JPL Ocean Simulation
- Spray Gliders
  - Mission 0011
  - Mission 0012
- Surface Currents
- Meteorological Observations
- **Forecasts**

SCCOOS OCEAN MOORINGS

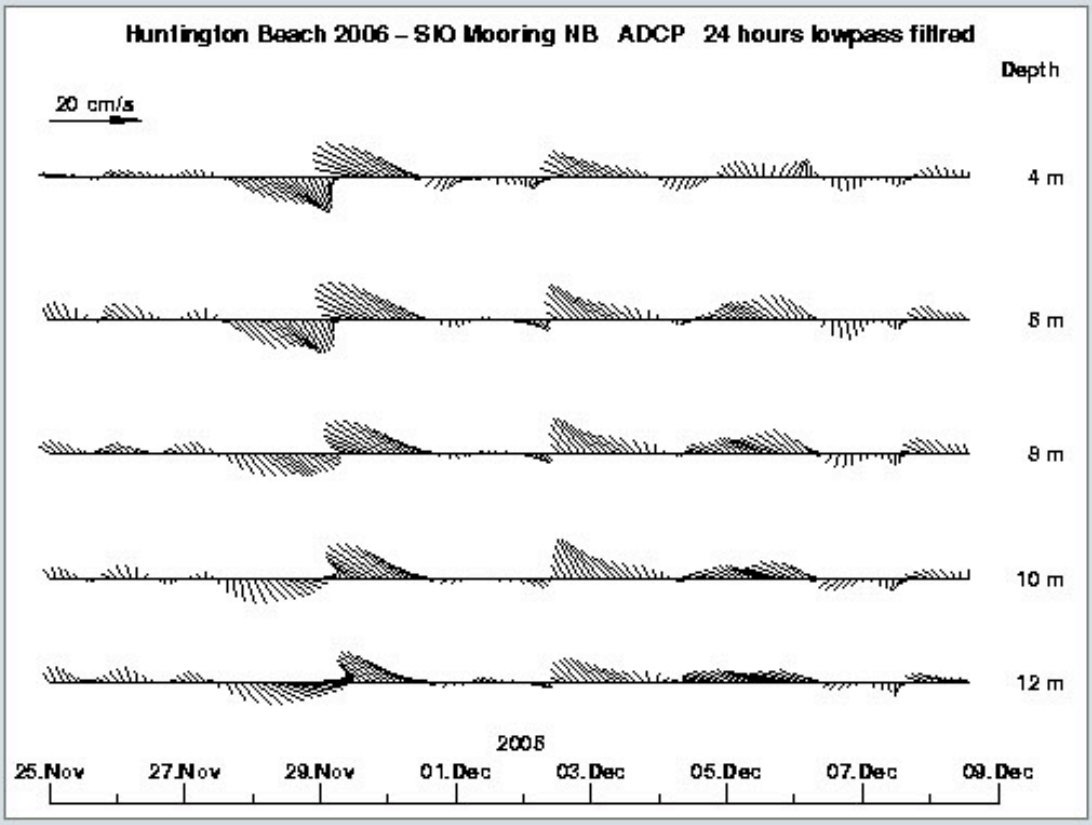


Observation type: Currents Map Animate

Higher Resolution:
Click on the image above to open a new window showing the image at full resolution.

Huntington Beach 2006

SCCOOS OCEAN MOORINGS



Observation type: Current Sticks

Duration of plotting window: 2 weeks

Mooring Installation: SIO-NB2

Higher Resolution:

Click on the image above to open a new window showing the image at full resolution.

Huntington Beach 2006

SCCOOS Projects

- Hyperion Diversion
- Huntington Beach (HB06)
  - Overview
  - Instrument Map
  - Project Calendar

Huntington & Newport Beach

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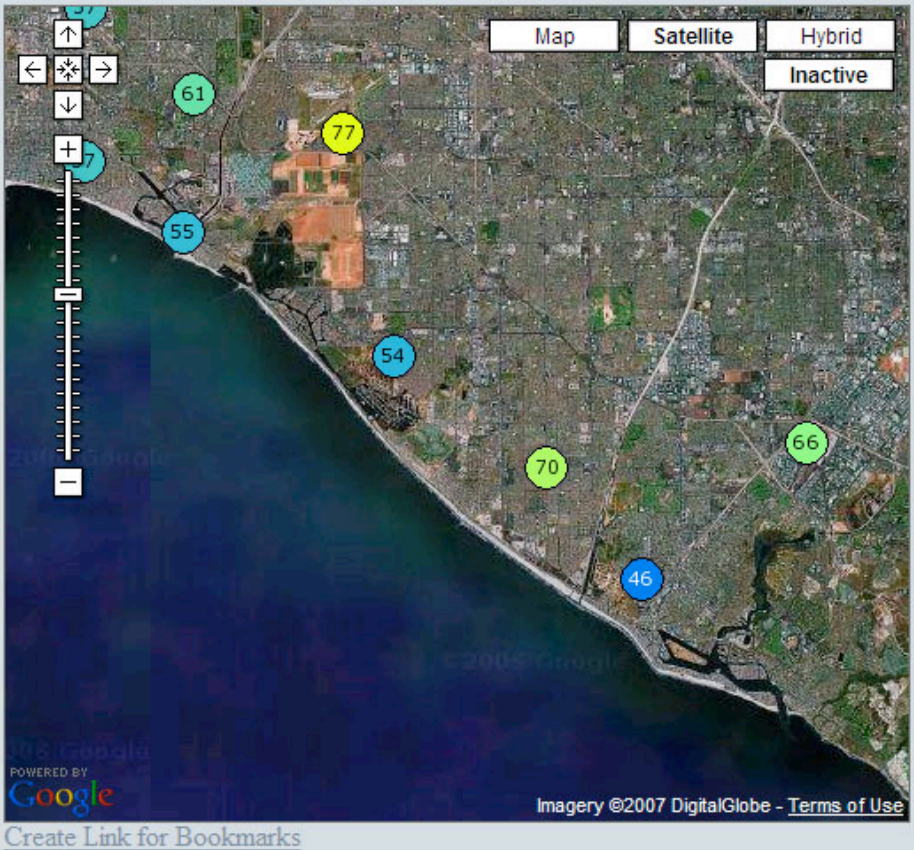
- Meteorological Observations
- **Forecasts**
  - Winds
  - Precipitation
- **Satellite Products**
  - OCM
  - MODIS
  - Hourly GOES
- Wave Observations

Learn about Instruments

- Overview
- HF Radar
- REMUS AUV
- Offshore Drifters

RECENT METEOROLOGICAL STATIONS REPORTING



Create Link for Bookmarks

Now Showing:

Channel: Air Temperature Units: °F

Filters:

Providers: MARITIME, SCCOOS, OCSD, MesoWest, RAWS, APRSWXNET, OTHER-MTR, WXforYou, NOS-PORTS

Regions: Morro Bay, Santa Barbara Channel, Ventura County, South Channel Islands, Los Angeles County, Orange County, North San Diego, San Diego, All Regions

Distance: < 15 km

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View Experiment Data

October 2006

Su	M	T	W	Th	F	S
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

<< < > >>

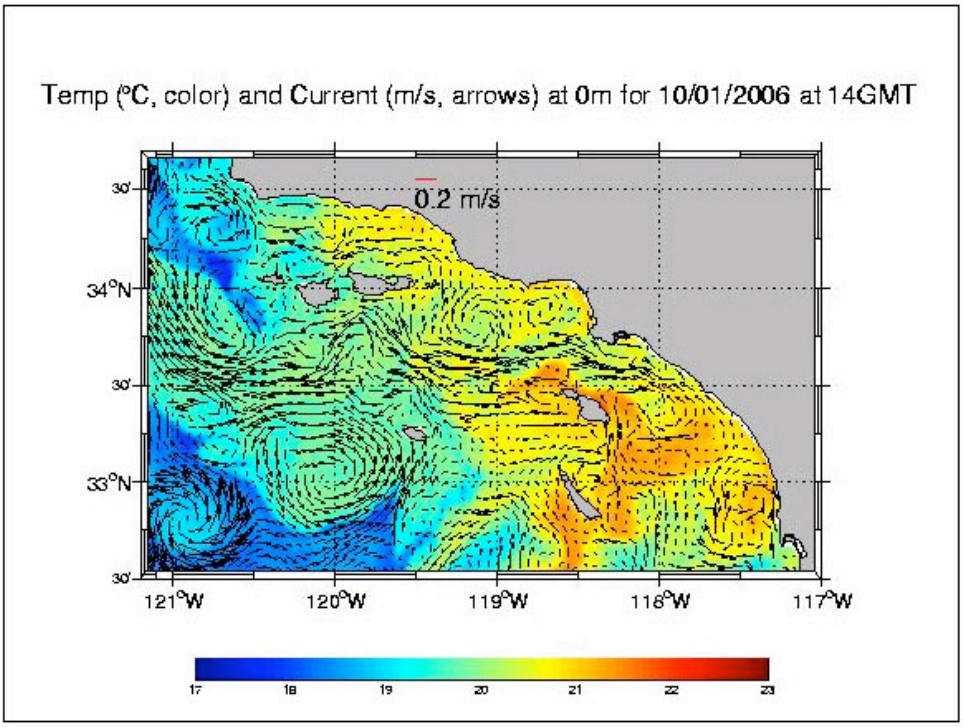
HB06 Products

- (•) *ROMS*
- ( ) *MM5 Winds*

Data description
Documentation

Variable:	Domain:	Forecast Hour at:	Depth at:	LAS:
(•) Temp ( ) Sal ( ) Curr	(•) SCB ( ) HB	14 (Day 1) (GMT)	0 (m)	LAS

Animation



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October 2006

Su	M	T	W	Th	F	S
01	02	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

<< < > >>

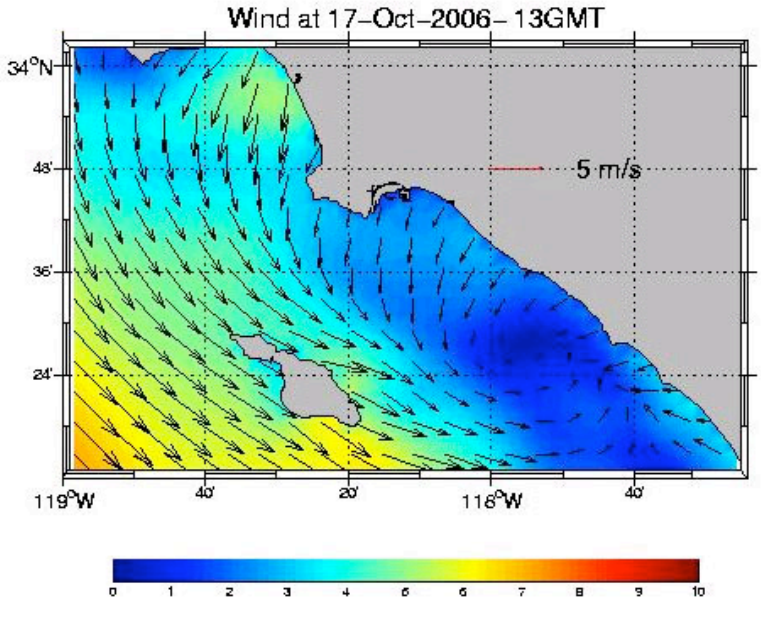
HB06 Products

- ROMS
- MM5 Winds

Data description
Documentation

Variable:	Domain:	Forecast Hour at:	LAS:
Wind at 10m	SCB HB	13 (Day 1) (GMT)	LAS

Animation



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SCRIPPS INSTITUTION OF OCEANOGRAPHY

Home | Data | News | Contact | Pictures | Status | UCSD

Mission ID = 06901201

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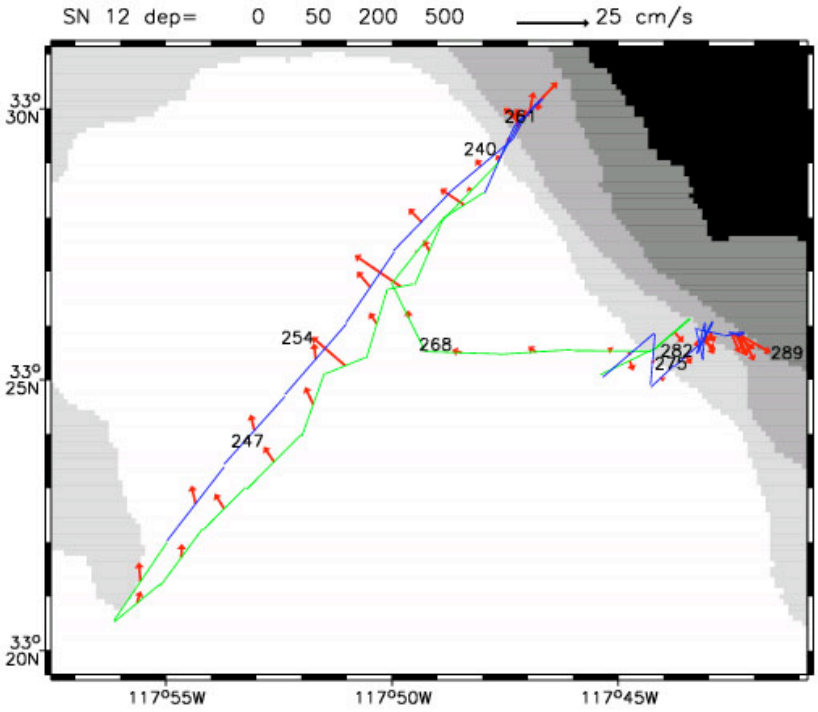

Please Input dive range and select type of plot to present:

Dives: 239 - 289

Track - Position and Current Plot: BORDER = .1 times distance between first and last selected dives

ENG - Engineering Data

Pixels	Contours
Temperature	Temperature

Section Plot | Profile Plot

SCRIPPS INSTITUTION OF OCEANOGRAPHY

Home | Data | News | Contact | Pictures | Status | UCSD

Mission ID = 06901101

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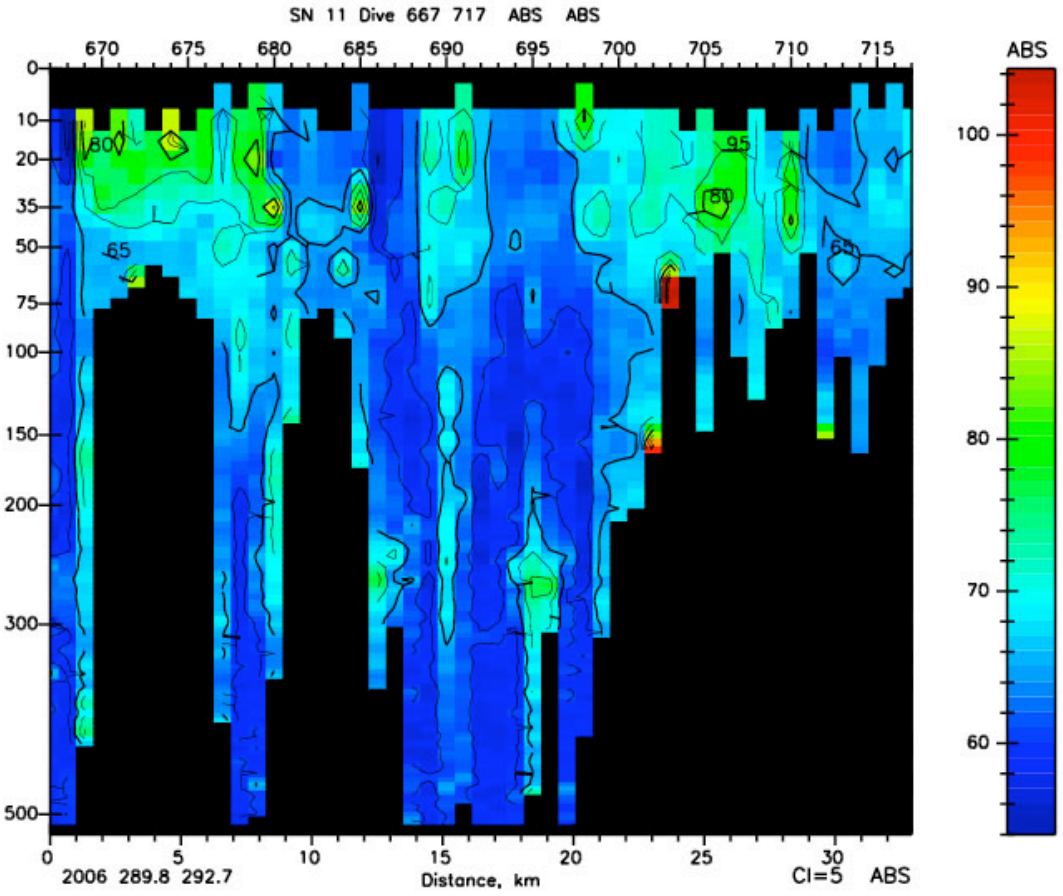


Please Input dive range and select type of plot to present:

Dives: 667 - 717

Track - Position and Current Plot: BORDER = .1 times distance between first and last selected dives

ENG - Engineering Data

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

ABOUT DATA PROJECTS COMMUNITY and CLASSROOM INTERACTIVE HOME

Hyperion Diversion

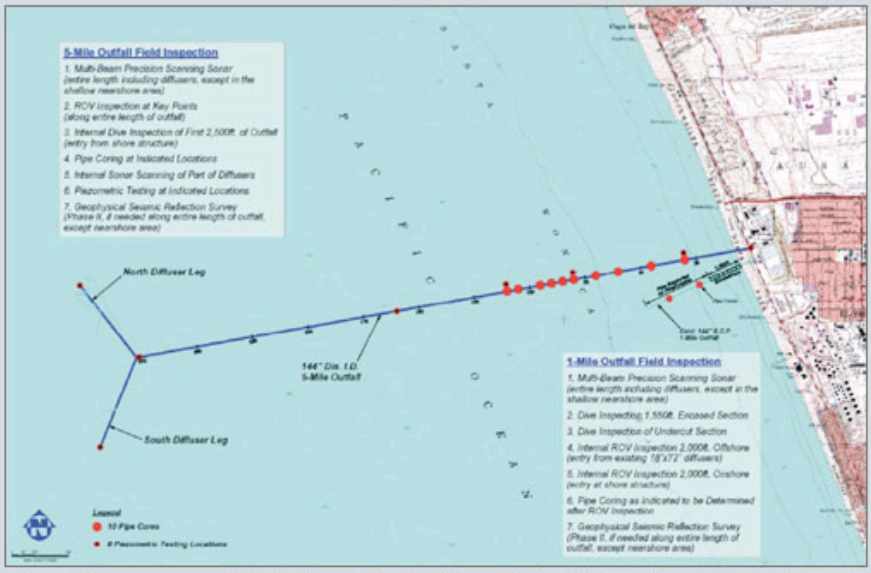
ENVIRONMENTAL DATA SUPPORT

FOR THE HYPERION 5-MILE OUTFALL INSPECTION

November 28-30, 2006

Geography of the Hyperion 5-mile diversion

The official City of Los Angeles Department of Public Works website.



Map of Hyperion outfalls in Santa Monica Bay. During November 28-30, the Hyperion sewer discharge will be diverted from the 5 mile pipe to the shorter One-Mile Outfall to allow inspection of the longer outfall pipe. The discharge is typically 300-350 million gallons per day, with a total estimated volume of discharge to approach 875 million gallons. The Southern California Coastal Ocean Observing System has created this web site to provide up-to-date ocean environment information to assist coastal managers during this discharge event.

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

ABOUT DATA PROJECTS COMMUNITY and CLASSROOM INTERACTIVE HOME

Hyperion Diversion

SCCOOS Projects

- Hyperion Diversion
  - Overview
  - About
  - Documents
- Huntington Beach (HB06)

Local Environmental Information

- Automated Shore Station
- Meteorological Observations
- Plume Tracking
- Surface Currents
- Surfzone Currents
- Forecasts
  - Winds
  - Precipitation
- Satellite Products
  - OCM
    - Chlorophyll
    - Total Suspended Matter
    - True Color
  - MODIS
    - Chlorophyll
    - $L_{wN}(551)$
    - Sea Surface Temp.
  - Hourly GOES

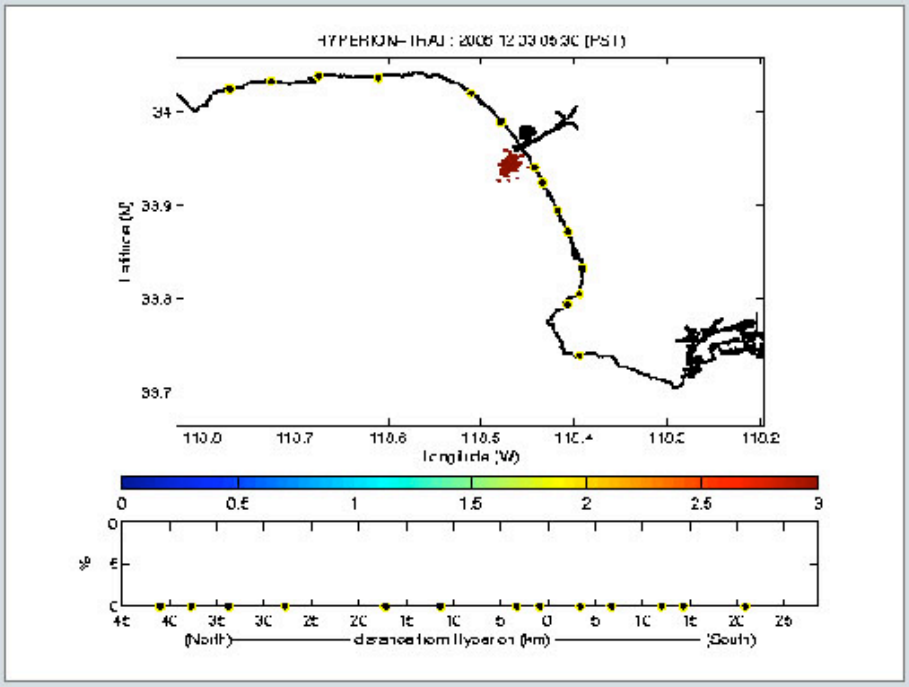
STORMWATER PLUME TRACKING

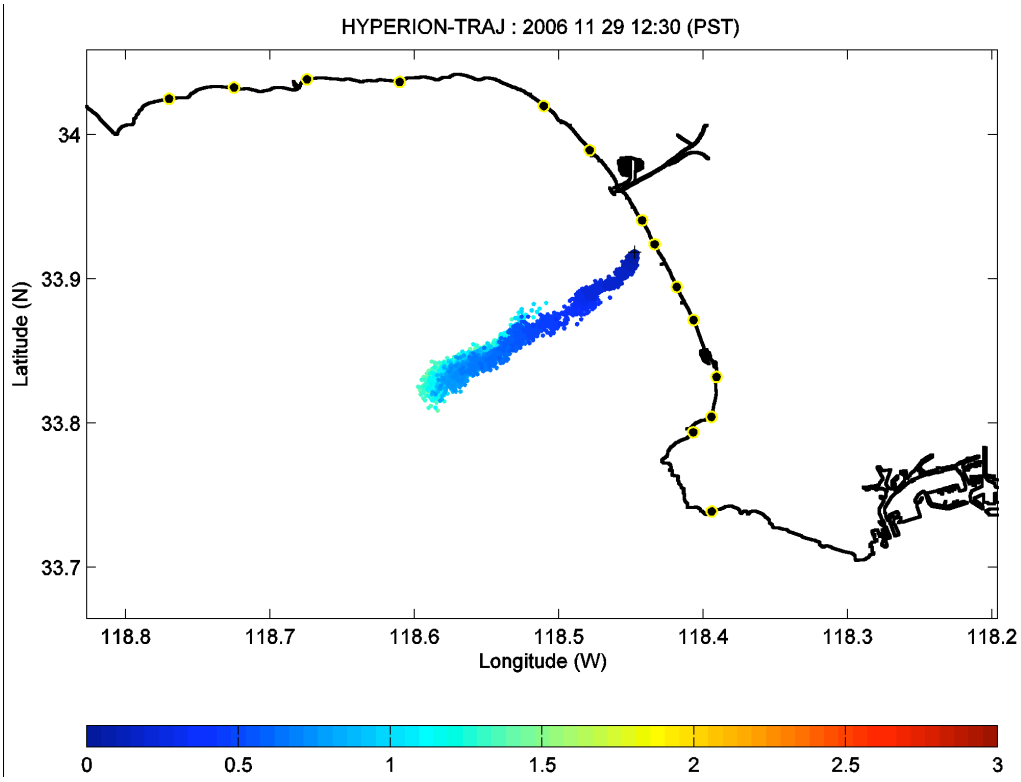
HYPERION OUTFALL

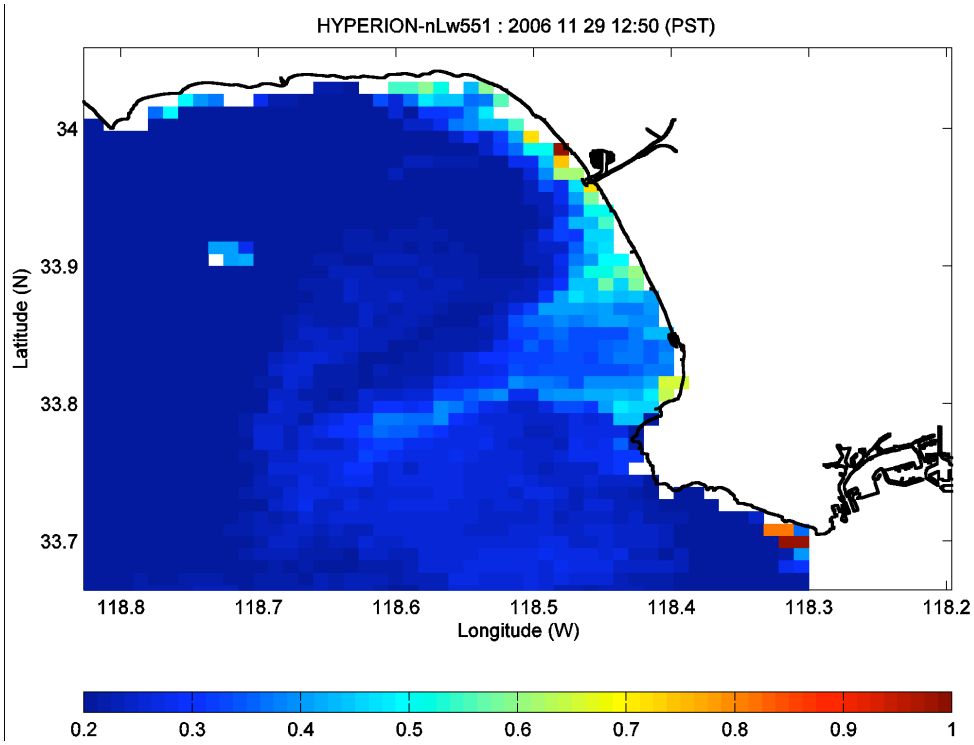
Start Animation 1/2 sec **Hourly Steps**

-119	-118	-117	-116	-115	-114	-113	-112	-111	-110	-109	-108
-107	-106	-105	-104	-103	-102	-101	-100	-99	-98	-97	-96
-95	-94	-93	-92	-91	-90	-89	-88	-87	-86	-85	-84
-83	-82	-81	-80	-79	-78	-77	-76	-75	-74	-73	-72
-71	-70	-69	-68	-67	-66	-65	-64	-63	-62	-61	-60
-59	-58	-57	-56	-55	-54	-53	-52	-51	-50	-49	-48
-47	-46	-45	-44	-43	-42	-41	-40	-39	-38	-37	-36
-35	-34	-33	-32	-31	-30	-29	-28	-27	-26	-25	-24
-23	-22	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12
-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	END

An animated gif has been created as an alternative to this animation sequence.




HYPERION-TRAJ : 2006 11 29 12:30 (PST)
Latitude (N)
34
33.9
33.8
33.7
118.8
118.7
118.6
118.5
118.4
118.3
118.2
Longitude (W)
0
0.5
1
1.5
2
2.5
3


HYPERION-nLw551 : 2006 11 29 12:50 (PST)
Latitude (N)
34
33.9
33.8
33.7
118.8
118.7
118.6
118.5
118.4
118.3
118.2
Longitude (W)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

ABOUT DATA PROJECTS COMMUNITY and CLASSROOM INTERACTIVE HOME

Hyperion Diversion

SCCOOS Projects

- Hyperion Diversion
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  - About
  - Documents
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- Automated Shore Station
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- Surface Currents
- Surfzone Currents

Forecasts

- Winds
- Precipitation

Satellite Products

- OCM
  - Chlorophyll
  - Total Suspended Matter
  - True Color
- MODIS
  - Chlorophyll
  - $L_{wN}(551)$
  - Sea Surface Temp.
- Hourly GOES

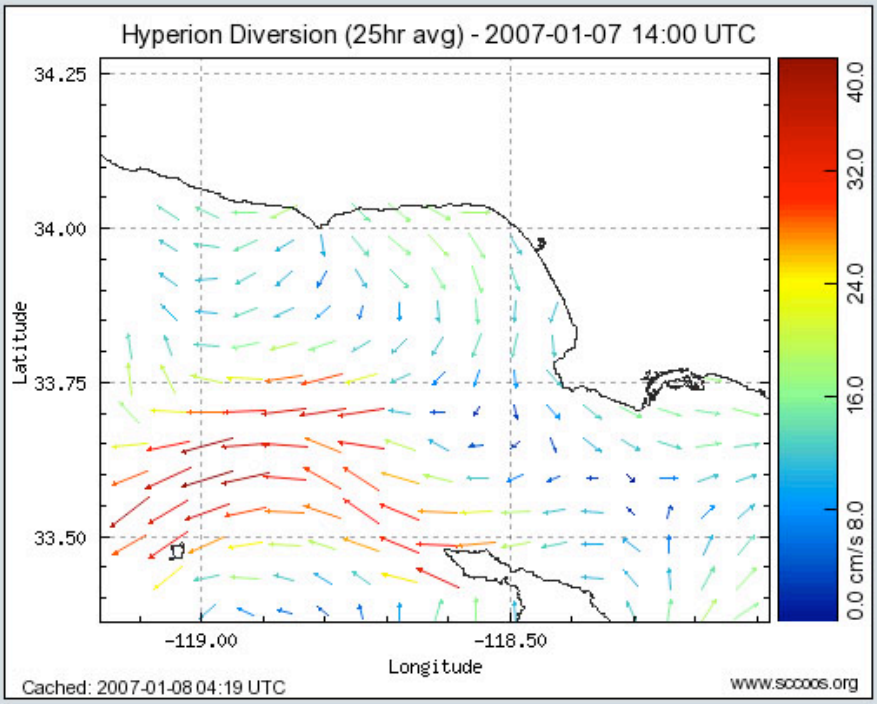
SURFACE CURRENT MAPPING

Latest Objectively Mapped Surface Currents

Objectively Mapped Surface Currents

Animation

HFRADAR Derived 25-Hour Averaged Map



For more currents, visit our interactive page.

SCCOOS SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

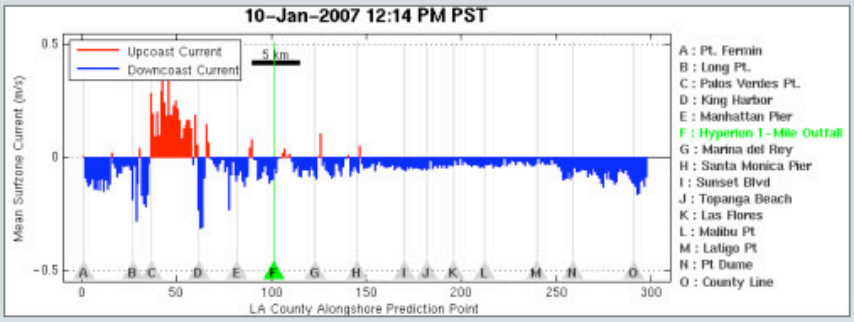
ABOUT DATA PROJECTS COMMUNITY and CLASSROOM INTERACTIVE HOME

Hyperion Diversion

COASTAL DATA INFORMATION PROGRAM

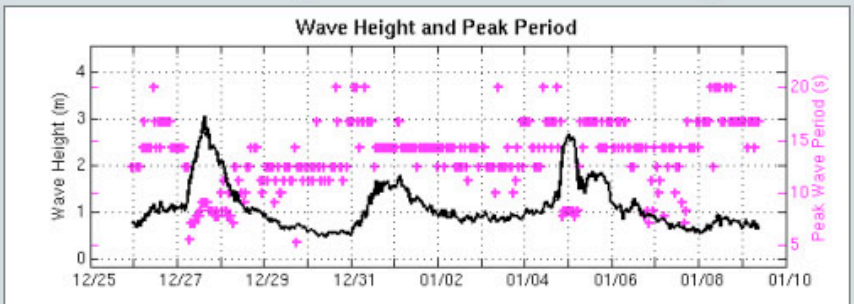
Nearshore Monitoring & Prediction Group

LA County Alongshore Surfzone Current Nowcast



LA County Alongshore Wave Height & Peak Period Nowcast

Recent Surfzone Wave & Alongshore Current Predictions Shoreward of Hyperion Outfall



Date: 2006-12-03 13:30 GMT (2006-12-03 05:30 PST)

Station ID	Station Name	Particle Count	Plume Potential
1	N1	0	NO
2	N2	0	NO
3	N3	0	NO
4	Malibu	0	NO
5	Santa Monica Beach	0	NO
6	Venice Beach	0	NO
7	Dockweiler Beach	0	NO
8	Hyperion	0	NO
9	Manhattan Beach	0	NO
10	Hermosa Beach	0	NO
11	Redondo State Beach	0	NO
12	Palos Verdes Estates	0	NO
13	Palos Verdes Estate	0	NO
14	Rancho Palos Verdes	0	NO

This display shows the results of a lagrangrian particle tracking algorithm applied to hourly surface currents. The plot indicates the tracking of surface waters from the Hyperion One-Mile Outfall. On an hourly basis, 100 particles are released at the outfall location and tracked for a 3 day period to provide an estimate of the spatial extent of the diversion discharge. New positions within the region are updated hourly and the color of the particle represents the age of the particle since it was released.

These computations and graphical displays are ***experimental*** and must be used with caution. While considerable effort has gone into ensuring the highest quality data, significant differences between measured currents and actual currents can occur. This information should not be used to make any navigational or other decisions that might endanger public safety or put anyone at significant risk. We reserve the right to ADD, CHANGE or DELETE any product WITHOUT PRIOR NOTICE.

APPENDIX H

State of California ASBS Map

State of California
Areas of Special Biological Significance (ASBS) Sites

08. Redwoods National Park
06. Trinidad Head
07. Kings Range
01. Pygmy Forest
05. Saunders Reef
02. Del Mar
03. Gerstle Cove
04. Bodega Bay
14. Bird Rock
12. Point Reyes
13. Double Point
11. Duxbury Reef
10. Farallon Islands
09. Fitzgerald
15. Ano Nuevo
19. Pacific Grove
34. Carmel Bay
16. Point Lobos
18. Burns Underwater Park
20. Salmon Creek
17. Channel Islands
24. Mugu Lagoon
22. So. Channel Islands
32. Newport Beach
33. Irvine Coast
30. Heisler Park
25. Catalina Head
26. Little Harbor
27. Farnsworth Bank
28. Binnacle Rock
21. San Nicolas Island
23. San Clemente Island
31. San Diego-La Jolla
29. San Diego

APPENDIX I

Coverage of SCCOOS News

Example of Coverage of SCCOOS News

Surfer Magazine
January 1, 2007
The Southern California Coastal Ocean Observing System is measuring the reach of the Tijuana Plume, launching a Web site with graphics and data that track the far-reaching effect of the Tijuana River (www.sccoos.org/data/tracking/IB/).

Media covering Hyperion Outfall diversion event and SCCOOS supported monitoring
November 28-30, 2006

- LA Times
- The Mercury News
- Contra Costa Times
- San Diego Tribune
- San Luis Obispo Tribune
- The Press Enterprise
- North County Times
- The Desert Sun
- Seattle Post-Intelligencer
- Chicago Sun-Times
- Herald-Tribune (Southwest Florida)
- KFWB News 980 Los Angeles
- KCBS 740 AM San Francisco-Oakland-San Jose
- LA DailyBreeze.com
- Diving-News.com
- Scubapost.Net
- Codaros.com

Public Information as provided by:

- City of Los Angeles press releases
- SCCOOS News
- SCCOOS web site
- Heal the Bay.org

Coverage of Congressman Rohrabacher's visit to HB06 demonstration site

Congressman Rohrabacher visited the Southern California Coastal Ocean Observing System

Washington, Sep 22, 2006 *- On September 22, 2006, Rep. Rohrabacher visited the Southern California Coastal Ocean Observing System (SCCOOS) Huntington Beach 2006 field experiment focusing on nearshore and surfzone observations in San Pedro Bay. The Huntington Beach field experiment is focused on the understanding and prediction of nearshore currents-critical in predicting the fate and determining the origin of contaminants in this zone that extends from the shoreline to approximately 2km offshore. It is the most heavily used part of the coastal ocean, and the region where water quality is most seriously impacted by pollutants. At the site, instruments had been installed in the surfzone to collect data used for validating and calibrating nearshore current models. During Rep. Rohrabacher's visit a pink dye was released to allow researchers to use dye sensors to track its movement in the surfzone to improve their prediction of nearshore currents. The results can then produce mapping products useful for understanding the transport of pollutants along the coast. For more information on SCCOOS Huntington Beach 2006 go to www.sccoos.org*

Borderless Innovation
A Report by Dialogue
City of San Diego
December 2005

SCCOOS is recognized as an example of long standing collaboration of marine sciences institutions in San Diego and neighboring Baja California, including mention of SCCOOS signatory partners CICESE and UABC.

COASTAL CONNECTIONS

VOLUME 5, ISSUE 2 | A BIMONTHLY PUBLICATION FOCUSED ON TOOLS FOR COASTAL RESOURCE MANAGERS | APRIL / MAY 2007

COASTAL MANAGEMENT PROFILE

Tom Shyka
Chief Operating Officer
Gulf of Maine Ocean Observing System (GoMOOS)

Where you live: Cape Elizabeth, Maine.
Family: Wife Laney, 17-month-old son Simon, and black labs Jack and Baxter.
Education: B.A. in environmental science, Colby College; M.S. in marine ecology, University of Maryland.
Most fulfilling aspect of your job: The positive feedback I get from GoMOOS' end-users.
Most challenging aspect of your job: Our biggest challenge is prioritizing in the face of overwhelming opportunity. It's a great challenge to have but occasionally frustrating when you have to pass up opportunities.
One work-related accomplishment that makes you proud: Three years ago, I partnered with Amy Holt Cline at the University of New Hampshire Coastal Observing Center to start a summer program for elementary and high school

Continued on Page 2

FOCUS

The Integrated Ocean Observing System

Three stories illustrate the capacity of this nationwide "system of systems" to address many coastal-management issues.

The Integrated Ocean Observing System (IOOS) makes possible a wide array of data and products used to address natural hazards, maritime safety, national and homeland security, public health, climate change, and use of coastal and ocean resources.

However, this network of buoys, sensors, satellites, and meteorological stations linked to data management and modeling systems is so vast that its capacity to tackle unique coastal concerns can be difficult to grasp.

To render the abstract more concrete, we offer three IOOS case studies—in South Carolina, California, and Alaska—that show how organizations and their partners use IOOS data and applications in distinctive ways to address coastal management concerns.

Aiding Emergency Management in South Carolina

In 2003, Jon Boettcher, manager of natural hazards plans with the South Carolina Emergency Management Division, met with representatives of the Carolina Coastal Ocean Observing and Prediction System (Caro-COOPS) to discuss its potential value to his division.

"In emergency management, we have lots of available information on hurricanes and other storm events when far from shore. But there is less data on how coastal and nearshore areas are affected as storms approach the coast. With Caro-COOPs, we saw great potential to fill that nearshore, near-term void," says Boettcher. "We wanted to know whether Caro-COOPS could help us predict, one or two days before landfall, where a storm surge might occur, what the water levels might be, and where coastal inundation might happen."

The division had an opportunity to use Caro-COOPS data in 2004 when Hurricane Charley, which primarily hit the Gulf of Mexico region, smacked South Carolina's shores as a Category One. "Caro-COOPS sensor arrays helped forecast the probability of storm surge in particular areas of our coast and helped us gauge the potential depth of inundation," says Boettcher.

Continued on Page 2

Profile continued from Page 1

teachers. We helped them design lesson plans using ocean observing data. The program has grown to be nationally recognized.

One personal accomplishment that makes you proud: Prior to moving back to Maine, I lived in the Netherlands.

Things you do in your leisure time: In the last year, a lot of my time has been spent on the floor with Simon or following him around—I like to think about things from his perspective.

Before GoMOOS, Tom Shyka worked for an environmental consulting firm, marine labs in the U.S. Virgin Islands and California, Maryland Sea Grant, and the National Marine Sanctuary Program. His wide-ranging experience and technical know-how help him relate to GoMOOS' broad constituency.

"GoMOOS is diverse—in terms of our customers and partners and also geographically," says Shyka. [The Gulf of Maine links the coasts of Massachusetts, New Hampshire, and Maine with the Canadian coastal provinces of Nova Scotia and New Brunswick]. "We strive to work both within and beyond our region, so things that are effective locally are transferable nationally."

To that end, GoMOOS is helping to develop the Integrated Ocean Observing System (IOOS) regional association (RA) for the Northeast. "I am helping to coordinate the RA advisory committee," says Shyka. "We want to synthesize information about user needs so we can develop the most effective products."

Focus continued from Page 1

"In the future, we'd also like to know what waves can do as they interact with storm surge. We suspect that the stronger and higher the waves, the further inland the water will travel during storm surge. We would really like to see Caro-COOPS become involved in this area, if funding and opportunity permits," adds Boettcher.

Monitoring the California Coast

Mas Dojiri is a wastewater treatment laboratory manager for the City of Los Angeles' Environmental Monitoring Division (EMD) in California. In November 2006, the EMD partnered with several organizations to monitor the course—and environmental effects—of treated sewage effluent as it was diverted from its customary route to a different pipeline emptying one mile off the coast of Santa Monica Bay.

The Hyperion sewage treatment plant in Los Angeles has two discharge pipes for treated effluent. One pipe, used rarely, discharges a mile offshore. The other pipe, used regularly, discharges five miles offshore.

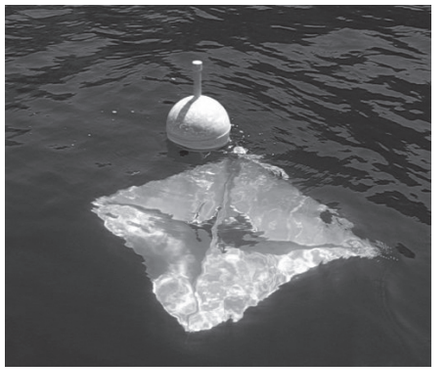
"Our five-mile pipe is 46 years old, so we wanted to examine its structural integrity," says Dojiri. That task required effluent to be redirected to the one-mile pipe so that divers could enter the five-mile pipe and inspect it safely. A remotely operated camera wouldn't do the job. "Divers have to use their fingers to check the pipe joints for possible corrosion," says Dojiri.

Personnel with the Southern California Coastal Water Research Project (SCCWRP) expressed interest in monitoring the three-day discharge event, and they were quickly joined by other partners—the Southern California Coastal Ocean Observing System (SCCOOS), NASA's Jet Propulsion Laboratory, Scripps Institution of Oceanography, University of Southern California, and University of California, Los Angeles.

"Everybody brought something different and valuable to the table," says Dojiri. Working together, the partners used a multitude of ocean observation tools: aerial photos; synthetic aperture radar that provided photographs of the effluent plume as viewed from space; near-real-time discharge velocity data through the use of high-frequency radar; and boat-based "drifters" in the water that logged the current's real-time direction and speed before, during, and after the diversion event.

All available data were quickly posted on the SCCOOS Web site, making it accessible to organizations, agencies, and the public. In addition, scientists inside and outside EMD monitored environmental effects through water sampling for temperature, salinity, bacteria, nitrogen, phosphorus, phytoplankton, and other parameters.

The rewards from this collaboration have been many. First, divers examining the five-mile pipe discovered that it was in remarkably



Courtesy Pacific Gyre, Inc.

This basketball-shaped sphere—termed a "drifter"—is equipped with a Global Positioning System unit and an underwater kite. When the kite is pulled by ocean currents, data on the speed and direction of the current are transmitted to a land-based receiver. (To learn more, see "Focus.")

good condition. Second, high-frequency radar data and particle modeling correctly predicted that the treated effluent would flow in an offshore direction. Finally, data during and after the discharge event showed that any bacterial problems along the beaches were not caused by the effluent.

"The involvement of these scientific organizations offered a huge boost in our monitoring program—not only in scientific value, but also in public relations and outreach. The organizations involved had great credibility and integrity, and the transparency of the event allowed anyone who was interested to keep informed while it was happening," says Dojiri.

Addressing Stakeholder Concerns in Alaska

A hiker walking 1,000 miles per year along Alaska's coastline would take 44 years to complete the journey. That fact is no surprise to Molly McCammon, executive director of the Alaska Ocean Observing System (AOOS).

"One of our challenges with AOOS is that we're a small state in terms of population but a huge state in terms of our coastline," notes McCammon. Starting with AOOS' genesis in 2003, McCammon sponsored or attended over 150 meetings, listening to Alaska's varied coastal stakeholders.

"It was clear from those meetings that we needed a central data portal for ocean and marine information. Initially, that has been our top focus," says McCammon.

"Coastal communities want to know the conditions of ice outside their back door, whether they're hunting whales, going out on a boat or snow machine, or concerned about storms or ice conditions affecting their roads and shoreline," she adds.

Now AOOS' Web site allows stakeholders to view weekly animations of Arctic sea-ice concentration, and people in the town of Barrow can access real-time ice data from their televisions. Other Web information includes current sea-surface temperatures and wave activity in Alaskan waters, as well as Web cams of current weather conditions. Additional geographic information system and video imagery products will soon be available as well.

Collaborating within, and across, Regions

In addition to her duties in Alaska, McCammon also serves as chair of the National Federation of Regional Associations (NFRA), an organization that assists regional associations in linking their efforts and expanding IOOS outreach.

According to McCammon, the importance of regional associations and the federation cannot be overestimated. "Regional associations connect stakeholders across various agencies and issues," says McCammon. "They also link coastal localities, municipalities, counties, and multiple states, and sometimes even cross national borders, as in the case of Canada and Mexico. The NFRA is important because it offers a way for those of us in different regions to discuss issues and speak with a single, unified voice." (To learn more about regional associations and the NFRA, see "IOOS Resources.")

IOOS RESOURCES

Interested in getting the most out of IOOS data and applications? The following organizations and initiatives can help:

• **Regional Associations (RAs)** – As part of the national plan for IOOS, 11 RAs were established to coordinate and support IOOS efforts within their regions. With funding from NOAA, and administrative and technical support from the NOAA Coastal Services Center, these associations help stakeholders assess their coastal and ocean observation needs and identify the most useful data and applications. Association members also benefit by networking with other members and sharing IOOS success stories and lessons learned. To locate the RA in your area, visit *www.csc.noaa.gov/ras/*.

• **National Federation of Regional Associations (NFRA)** – This organization promotes the development of regional associations nationwide and helps coordinate their activities. The federation also oversees consistency within the associations, leads communication among regions, and assists in the design and planning of IOOS within and across regions. The Center coordinates with the NFRA on specific tasks. For more information, visit *www.usnfra.org*.

• **Coastal Observation Technology System (COTS)** – Since 2002, NOAA has been building the capacity of regional observing systems through funding of COTS projects. These congressionally directed projects, administered through the Center, address a range of IOOS topics and play a major role in developing standards and protocols for data management and sharing. To learn more, visit *www.csc.noaa.gov/cots/*.

To find out more about the Center's role in these initiatives, contact *Mary.Culver@noaa.gov*.

Coastal Connections is a publication of the National Oceanic and Atmospheric Administration Coastal Services Center, produced for the coastal resource management community. Each issue of this free bimonthly newsletter focuses on a tool, information resource, or methodology of interest to the nation's coastal resource managers.

Please send us your questions and suggestions for future editions. To subscribe or contribute to the newsletter, contact our editors at

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NEWS AND NOTES

Coastal Zone Conference in Oregon

Nearly 1,000 coastal resource management professionals are expected to attend Coastal Zone 07 in Portland, Oregon, July 22 to 26. This year's theme, "Brewing Local Solutions to Your Coastal Issues," will incorporate a wide variety of related sessions, workshops, and field trips. For more information, visit *www.csc.noaa.gov/cz/*.

Maryland Premieres On-line Coastal Mapping Tool

The Maryland Coastal Program, in cooperation with Towson University Center for Geographic Information Sciences and Maryland Geological Survey, has released Maryland Shorelines Online. This interactive Web portal features a geographic information system mapping tool that aids users in assessing and managing coastal hazards, shoreline change, and coastal flooding. Visit the portal at *http://shorelines.dnr.state.md.us.*

Fourth Annual Ocean Power Conference and Exhibition in Hawaii

The Turtle Bay Resort in Oahu, Hawaii, will be the site of the Ocean Energy Council's annual EnergyOcean conference and exhibition, August 21 to 23, 2007. Policy makers and technologists from around the world are expected to attend this event, which will address power generation technologies such as wave, thermal, solar, hybrid, tidal-current, and offshore-wind power. Additional conference details are available at *www.energyocean.com/about.php.*

Transitions

Max Mayfield, capping 34 years of dedicated service, has retired as director of NOAA's National Hurricane Center, and **Bill Proenza**, former director of the National Weather Service Southern Region, has succeeded him... **Bruce Carlisle**, previously manager of the Wetlands Restoration Program for the Massachusetts Office of Coastal Zone Management (CZM), has been named acting director of this CZM... **Mike Shirley**, former research coordinator at Rookery Bay National Estuarine Research Reserve in Naples, Florida, has been appointed manager of the Guana Tolomato Matanzas Reserve... **Donna S. Wieting**, former deputy director of the National Marine Fisheries Service Office of Protected Resources, has been named deputy director of the Office of Ocean and Coastal Resource Management.

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APPENDIX J

Letters of Support

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April 13, 2007

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Ms Peck:

LETTER OF SUPPORT FOR THE SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM (SCCOOS AND THE REGIONAL COASTAL OCEAN OBSERVING SYSTEM)

The City of Los Angeles, Bureau of Sanitation's Environmental Monitoring Division (EMD) is supportive of the Southern California Coastal Ocean Observing System efforts to develop the Regional Coastal Ocean Observing System (RCOOS) for Southern California. SCCOOS provides badly needed coastal and ocean observations and generate extremely useful products for environmental managers, regulators, and nongovernmental agencies (e.g., environmental groups). The City conducts extensive monitoring in the coastal ocean of Southern California, primarily in Santa Monica Bay. A significant portion of this effort involves tracking the Hyperion Treatment Plant's effluent plume as it is discharged from the 5-Mile Outfall pipe into Santa Monica Bay and estimating bacterial concentrations at ankle depth in the surfzone due to the potential for pathogens to adversely impact public health. The effluent plume has the potential for traveling considerable distances and depositing organic particles, metals, and organic pollutants into the sediment within the Bay. Storm drains are the major source of bacteria and other pollutants to these waters, and they mostly discharge into the surfzone.

Southern California beaches and near-shore waters are world famous, and nearly 80 million people engage in water contact recreational activities at Los Angeles and Orange County beaches every year. This is not only an important component of the Southern California life style, but also an important economic engine for the region. Unfortunately, it has been estimated that between 627,800 and 1,479,200 "excess" cases of gastrointestinal illness occur at these beaches each year with estimated healthcare costs of $21 million to $414 million annually; thus, ensuring good, safe water quality along our coast is a high priority. In addition, the deposition of pollutants and their subsequent accumulation have adverse impacts on the benthic macrofaunal and demersal fish and invertebrate communities. Some of the seafood, e.g., white croakers, have been issued fish advisory notices and may not be safe for consumption.

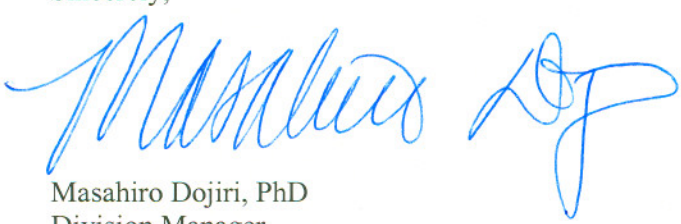
Knowledge of circulation patterns in the coastal region is meager, especially from a regional perspective. A better understanding of circulation in the shallow and near-shore regions could be extremely valuable because it holds the potential to forecast the fate of surfzone and near-shore pollutants, which would increase our ability to protect public health and the environment.

The work conducted by SCCOOS is important because it is focused on improving our understanding and potential for modeling dispersion within a few hundred meters of the shoreline, which is where most water-contact recreation occurs, as well as the near-shore waters. This information will be useful in studying stormwater dispersion and fate, as well as discharges from wastewater treatment plants. I believe this will greatly benefit monitoring efforts aimed at protecting public health and the environment.

The City of Los Angeles' Hyperion Treatment Plant recently diverted the flow of its wastewater from a pipe with an outfall that is five miles from the shoreline to one that is only one mile from the shoreline in order to inspect the 5-mile pipe. The diversion lasted approximately three days and about 800 million gallons of secondary-treated effluent was discharged through the 1-mile pipe. EMD in conjunction with other researchers conducted an extensive monitoring effort during this diversion. Our monitoring effort greatly benefited from surface current information provided through the Southern California Coastal Ocean Observing System (SCCOOS). The real-time current information provided by SCCOOS enabled us to adaptively modify our sampling grid to better track the discharge plume and to predict the dispersion of the surface plume by the use of a trajectory model developed by SCCOOS researchers using high frequency radar data. If the winds had blown onshore, EMD would have utilized the surfzone model developed by Scripps Institution of Oceanography through SCCOOS to predict the dispersion of the effluent in the surfzone. We believe improved understanding of dispersion in the surfzone may similarly benefit our monitoring efforts in the future, as well as those of the Orange County Sanitation Districts, which is planning a similar outfall inspection and 1-mile outfall diversion in the near future.

In summary, the City of Los Angeles shares an interest in better understanding the dynamics of water transport in the surfzone and near-shore waters, which may increase our understanding of the fate of flow from storm drains and other sources into the surfzone as well as the flow from offshore sources into the surfzone. Because of this, the City believes it is likely to directly benefit from the ocean observing activities proposed by SCCOOS; the City heartily endorses the proposal and recommends it be funded.

Sincerely,



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