SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

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SCCOOS

aims to synthesize its observations into products that will provide a scientific basis for evaluating and improving management and guardianship of, and response to the ocean environment and its resources. SCCOOS will: make observations, collect real-time data, and develop models; convert these into products that are useful to the public, and to agencies and organizations interested in the ocean; and solicit feedback from these users on how these products can be improved.

TARGETED OBSERVATIONS SUPPORTED BY NOAA & STATE OF CALIFORNIA FUNDING

(to be available in a 1-3 year time frame)

Surface Currents

- Maps of surface currents will evolve in their sophistication. Initially, velocity maps from quality controlled, high-resolution (1 km) and long-range (6-10 km) HF radar (Surface Current Mapping Hardware) observations will be available. Later, data-driven surface current maps from the regional ocean modeling (ROMS) assimilating models will provide seamless current maps extending from the beach to waters offshore. Both real-time and archived data will be publicly available by Internet in both graphical form and as data files for downloading.
- Trajectory analyses based on the spatial surface current information will describe the motion of water parcels as a function of time from particular origins. Trajectories will be available in real time from key locations (e.g. potential discharge sites). Data archives will be maintained in various formats as defined by key users.

Subsurface Currents

- The three Coastal Ocean Currents Monitoring Program (COCMP) gliders *(buoyancy driven underwater robots that can be deployed for 6 months)* and the Santa Monica Bay mooring, three NOAA gliders and moorings near La Jolla and Santa Barbara, and current profilers from the Orange County Water District and other agencies along the coast will describe subsurface currents. These data will be used to constrain the ROMS model and will be publicly available through a web page that shows recent time series of velocity from moorings and velocity sections from gliders.

Surfzone and Nearshore Currents

- Interactive web pages will provide real-time "nowcasts" of vertically-averaged alongshore currents between the shoreline and about 2 km offshore. The alongshore resolution will be a few 100m. The flow estimates, based on simplified models driven by observed winds, waves, and alongshore pressure gradients, will be updated at least daily.
- The wave momentum stress, which drives alongshore, surfzone currents, will be predicted for the Southern California Bight as an extension of the California Data Information Program *(cdip.ucsd.edu)*.
- During intensive month-long periods, additional observations will provide more comprehensive velocity products including vertical, horizontal, and temporal variation of the flow field on the inner shelf (within 2 km of shore, but seaward of the surfzone). Inner-shelf drifter trajectories will be updated every 3 hours, while surfzone flows are mapped with fixed flowmeters and drifters. All products will be useful for model calibration and validation and, given experience, these velocity fields may be combined to produce full, three-dimensional maps of nearshore flows.

Subsurface Water Properties

- Density stratification from all SCCCOS gliders, moorings, and the underway CTD sections from San Pedro to Avalon, and Ventura to Santa Cruz Island will be published in near-real-time by website.
- ROMS assimilated products will provide 3D fields of temperature, salinity, currents, and several biogeochemical parameters. The temporal resolution of these products will span scales from hours to years.

Sea Level

- ROMS will provide sea level nowcasts and forecasts as driven by baroclinic and barotropic tides, local winds, and remote forcing. Sea level predictions on the coastline will be available in real time on the web.

Satellite Observations

- Satellite observations of sea surface temperature and ocean color products, such as primary productivity, total suspended matter, chlorophyll, and diver visibility, will be available as overlays on surface current maps. Overlays will be created in near-real time, integrated with other observations, and archived online.

Surface Meteorology

- Maps of surface wind fields and other meteorological properties (e.g. air temperature, relative humidity) will be available at 3 km resolution daily. The daily report will include hourly predictions over 3 days for a domain spanning the Southern California Bight.

PLANNED PRODUCTS & APPLICATIONS

Water Quality

When coupled with compliance-based water quality monitoring, COCMP products will aid in identifying the source of pollution that impacts beaches and coastal waters.

- The transport processes that carry bacteria or other pathogens to the beach can be deduced using time histories of trajectory maps from regions of measured contamination. Statistical descriptors provide confidence in determining when ocean transport processes are favorable for contaminated water to reach specific locations. Applications may include the generation of risk indices, early warning tools for the start and end of beach contamination events, and notice of when beach water sampling should take place.
- Real-time, forecasts, and statistical archives of the criteria for when NPDES discharge plumes may surface can be created through coupling the EPA PLUMES model to observations and modeled fields of subsurface stratification.
- The fate, transport & dispersion of plumes from known stormwater discharges and outfalls can be determined from modeled and observed current fields. This will disclose which regions of the coastline and receiving waters are most exposed to stormwater discharge, cooling water from power plants, or brine from desalinization plants.
- Understanding when discharges may impact a region of the coastline will allow the development of adaptive management protocols to reduce the delivery of fecal bacteria or other materials to that region. For example, discharges could be timed to occur only when transport conditions are favorable to moving the discharge to a region of minimal impact (e.g. timing a dredge spoil release).

SCCOOS will work with the water quality agencies in Southern California to integrate agency monitoring data sets into the SCCOOS data system.

Oil Spill Response & Search and Rescue

Surface currents, waves, and wind fields observed and forecasted by COCMP infrastructure will aid oil spill response and prevention and search and rescue operations.

- Real-time surface currents and trajectories will allow the tracking of spills to aid clean up efforts.
- Real-time wind and wave fields will assist oil spill response personnel in deploying and managing operational assets (booms, spill response vessels, etc.)
- Statistical descriptions of circulation, wind, and wave fields can be used for assessing risk to existing and future sites where spills have a high probability of occurring.
- Surface currents, wind, and wave observations and forecasts are useful to search and rescue operations for both determining search regions and the deployment of recovery assets.

SCCOOS products will support federal (USCG, NOAA HAZMAT, USN, EPA, FAA), state (CA Office of Spill Prevention and Response), local (port districts, shipping and oil industry, marine safety offices) agencies, and the petroleum refinery and transport industry.

Marine Resources and Marine Protected Areas

- Statistical descriptions of surface trajectories help define egg and larval pathways connecting coastal marine communities, something that is particularly important in designing Marine Protected Areas.
- Determining dominant flow patterns and their interannual variability and climatic change is valuable for fisheries modeling, diagnosing environmental impacts on fishery productivity, and eventually factoring climate forecasts into setting fishing limits and fishery closures.

SCCOOS will provide velocity and temperature products to federal (National Marine Fisheries Service, National Ocean Service), state (CA Fish and Game), and other interested parties, including nongovernmental organizations.

Coastal Erosion

Data products to aid management issues related to coastal erosion depend on measurements and predictions of the alongshore wave climate and nearshore currents.

- Real-time and forecasted wave products for Southern California can be used as a predictive tool for assessing the extent of storm surge and storm driven erosion rates. The analysis and prediction of wave climate changes along the coastline will allow risk assessment of areas of high erosion on a regional basis (or within a littoral cell).
- The prediction of surf zone currents can be applied to models and forecasts of the alongshore transport of sediments, and define regions of accretion and erosion within littoral cells.

SCCOOS will provide products to local municipalities, the California Coastal Coalition, State (Dept of Resources), & Federal (Army Corp of Engineers, FEMA, NOAA, MMS) agencies.

Vessel Traffic Aids

- The ROMS model will provide hourly sea level predictions in sensitive regions to vessel traffic, including port entrances. The regional observing and modeling efforts will allow these to be driven by tides, local winds, and remote forcing.
- The real-time observations and predictions of waves, winds, and currents are of practical use to mariners for safe and efficient at-sea operations. User-friendly data web pages will be made available to the public.

SCCOOS will provide products to California Department of Boats and Waterways, Southern California port districts, USCG, NOAA, USN & other interested organizations.

sccoos.org

Partner Sites: Cal Poly, San Luis Obispo • Cal State Los Angeles • Centro de Investigación Cientifica y de Educación Surperior de Ensenada • Jet Propulsion Laboratory • Scripps Institution of Oceanography • Southern California Coastal Water Research Project Authority • Universidad Autonoma de Baja California • University of California, Santa Barbara • University of California, Irvine • University of California, Los Angeles • University of Southern California

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