



U.S. Integrated Ocean Observing System (IOOS) Implementation

Southern California Coastal Ocean Observing System (SCCOOS)

FY16-21 National Oceanographic Partnership Program Report:

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www.sccoos.org

1) PROGRESS AND ACCOMPLISHMENTS

SCCOOS continues to have the ability to achieve its milestones by providing access to high-quality integrated data and support regional user needs while complying with the standards and protocols for sharing and archiving data that are developed nationally. SCCOOS actively participates in IOOS Data Management efforts such as the Thematic Real-Time Environmental Distributed Data Services (THREDDS). By leveraging the Coastal Data Information Program (CDIP) and the HF Radar National Network programs, SCCOOS targets THREDDS distribution for wave, surface currents shore station data, and most recently the Carlsbad Aquafarm Burkulator and the Del Mar Mooring data. SCCOOS also continues to implement QARTOD data quality control standards. Wave and surface current data have associated XML and FDGC compliant metadata.

Climate Variability and Change

1. Operate and Maintain a network of glider lines to collect measurements of temperature, salinity, chlorophyll, current velocity, dissolved oxygen and acoustic backscatter; deliver data to SCCOOS website and push to modeling centers.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track with exception of dissolved oxygen. Gliders were equipped with dissolved oxygen sensors that were collecting data until 2012. At that point, the manufacturer (SeaBird) changed the design of the sensor that was being used and the new iteration isn't compatible with our gliders. The principle investigator is in the testing phase of adapting the new sensor to the glider fleet. It is undetermined when the new sensor will come online, and testing is underway to adapt the new sensor. Temperature, Salinity, Depth-average Velocity, time, latitude, longitude, where/depth and profile id are available for download at spraydata.ucsd.edu.
 - c. Successes: There are 3 Spray underwater gliders off the coast of California at all times sending back data on temperature, salinity and ocean currents. These missions are funded through IOOS and NOAA's Climate Program Office/Climate Observation Division. These data were used to feed the models that predict currents to help responders know where the oil will go. This demonstrates the importance of having a persistent observing asset that can immediately be used in an emergency.
2. Continue to develop integrate and enhance long-term time series products for distribution.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Automated archiving of SCCOOS data at NCEI. The first data set archived under the new automated process is titled "Oceanographic data collected from station Santa Monica Pier in the Coastal Waters of California by Institute of the Environment at University of California, Los Angeles, and assembled by Southern California Coastal Ocean Observing System (SCCOOS) Regional Association from 2005-06-16 to 2015-07-13 (NCEI Accession 0157016)." These archival data can be downloaded via links on this page: <https://accession.nodc.noaa.gov/0157016>. Each quarter, NCEI will initiate the automated process to archive all the station data assembled by SCCOOS during the previous month. You can find all of [the SCCOOS archived automated shore stations](#) through the [NCEI Geoportal](#) and the [NCEI IOOS Archive Data Portal](#)

Coastal Hazards Milestones

1. Compile database of historical bathymetry surveys. Develop model for Newport and Seal Beach inundation sites.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Bathymetric surveys of the Cardiff site are posted on the SCCOOS [site](#). Rather than immediately expanding to Newport and Seal beach, we have focused instead on improving the content and presentation of information at the Cardiff focus site. A more fully developed Cardiff

website will improve access to site-specific nearshore bathymetry, waves, and new products using recent developments in run-up and beach evolution modeling. Information on recent progress in run-up and beach change modeling are described in the attached publication (Fiedler et al., 2018) and manuscript in final review (Ludka et al.).

2. Shoreline inundation forecast, validation, and dissemination of warnings to select city managers.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Emails are sent to the City of Encinitas When the Cardiff flood index show potential flooding events 3 days in advance. Progress has also been made in the design of a framework for using available relevant data bases (e.g., nearshore waves and beach change, other economic and physical information) for optimal coordinated decision-making related to climate change and climate adaptation issues at regional scales.
3. Expand development and integration of inundation web site.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Surveys of sand levels on beaches and monitor storm inundations at selected locations are [posted](#) on the SCCOOS website. These data are used to validate and refine coastal data and forecast models of erosion, flooding, and inundation levels can be used to protect and improve beaches, real estate, and highways. These endeavors have led to the development of a statewide ‘flooding index’ forecast plots in accordance with the CDIP current research on wave run-up. The new plots are not based only on the tide and wave height, but also take the wave period into account. The resulting water level predictions are generally lower than those from the old model, but they should be significantly more representative of the actual water levels observed at the coast. The Cardiff CDIP water level page has been updated to include mild and moderate flood thresholds.

Ecosystems, Fisheries and Water Quality

1. Monitor Harmful Algal Blooms (HABs) at five pier stations by collecting weekly measurements of temperature, salinity, chlorophyll, nutrients and toxic species. Provide data online and distribute via the California HABMAP listserv.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Expanded HABs website to include Central and Northern California. Weekly reports are derived from a year long time series of sampling for HAB species and related water quality measurements and are provided to the California HAB Monitoring and Alert Program Group. *Pseudo-nitzscha* blooms that produce domoic acid are being monitored. The Caron lab at the University of Southern California (USC), is responsible for the analysis of domoic acid from the 5 SCCOOS HAB monitoring sites. The SCCOOS HAB program contributes to the statewide HAB Monitoring and Alert Program (HABMAP) initiated by NOAA, the California Ocean Science Trust, and the Southern California Coastal Water Research Project (SCCWRP). The HAB program generates a baseline time-series of ocean properties to monitor ocean conditions in the very near shore zone of the Southern California Bight. These measurements are used to develop forecast models for short term warnings. They also increase our knowledge of the sign, frequency and magnitude of variation of temperature, salinity, density, nutrients and pollutants.
2. Continue to collect CalCOFI observations and measurements
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track

- c. Successes: As part of CalCOFI-LTER program, SCCOOS displays parameters that are measured in the nearshore region of Southern California including temperature, salinity, zooplankton, phytoplankton, fish eggs and invertebrate larvae. These data are posted [online](#).
- 3. Conduct shipboard observations with CalCOFI surveys to count seabirds; post online.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On Track
 - c. Successes: Physical and ecological ocean patterns and processes constitute valuable information for Coastal and Marine Spatial Planning and marine protected areas monitoring. Under the auspices of SCCOOS, the California Current Ecosystem Long Term Ecological Research (CCE_LTER) program, and in conjunction with the California Cooperative Ocean Fisheries Investigation (CalCOFI), the distribution and abundance of seabirds during 3 seasonal surveys were studied. Survey reports and maps of species' distribution and abundance are published on SCCOOS [website](#).
- 4. Publish survey reports and maps of seabird species' distribution and abundance on SCCOOS web site.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On Track
 - c. Successes: Survey reports and maps of species' distribution and abundance are published on SCCOOS [website](#).
- 5. Display the 3-km ROMS ocean forecasting system for real-time operations statewide.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: 3-km California state-wide ROMS model with data assimilation and real-time forecasting capabilities have been running continuously. This state-wide ROMS model is assimilating both the HF radar surface current data and the vertical profiles of temperature and salinity from four Spray gliders as well as other available observational data sets including satellite sea surface temperature and vertical profiles of temperature and salinity from moorings, ships and floats. In addition to the display at the SCCOOS web site, we are also displaying some static ROMS images (nowcasts, forecasts and validations) on our [group website](#).
- 6. Validate the 3-km CA ROMS output against non-assimilated observations.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: On the daily basis, we are making on the order of 20 ensemble model forecast in order to quantify errors. Six hourly nowcasts and 72-hour forecast files are available via OpenDAP/THREDDS. A manuscript describing this validation effort is in progress and expected to be submitted early 2016. Three validation products have been developed and are being tested on the [PI's web site](#). On the daily basis, there are on the order of 100,000 satellite SST data that are assimilated into ROMS. The RMS difference between the ROMS nowcast and the original satellite SST data is slightly less than 1°C, comparable to the 0.5°C-1°C errors specified for the satellite retrieved SST data.

In addition to the assimilated data sets, the ROMS nowcast has been validating against a number of non-assimilated data sets. The results are summarized in a manuscript that was published in April 2017: <http://dx.doi.org/10.1016/j.dsr2.2017.04.013>.

- 7. Develop a coupled ROMS/biogeochemical model to aid the evaluation of the effects of nutrient inputs on bloom formation and nutrient cycles.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Fine-scale simulations with ROMS are being analyzed at UC, Los Angeles to examine two phenomena. First, pollution effluent dispersal from the Orange County and Hyperion

discharge outfalls are being assessed for their amount of augmentation of net primary productivity in the surrounding shelf regions. Second, the roles of surf current instability and the ensuing surf-eddy turbulence under various wave and coastline shape influences are being assessed how far offshore their influences reach. This is being done using two tactics; 1) Exploit the surface wave - current interaction and grid- nesting capabilities of ROMS to examine cross-shore exchange of materials in the shelf and surf zone. Sites near Pt. Conception, the northern Channel Islands, Santa Monica Bay, and the Newport region are the foci, and 2) Develop a coupled ROMS/biogeochemistry/ecosystem model to aid the evaluation of the effects of nutrient inputs on bloom formation and nutrient cycles, as well as variability and trends in hypoxia and acidification. The progress is posted [online](#).

8. Continue automated sampling at four shore stations to measure temperature, salinity, chlorophyll, turbidity and water level.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track with exception of the Santa Monica Shore Station. Calibration samples have been collected during cleaning and service dives, however incorporation of data quality checks from 4 stations is not feasible at the current funding level.
 - c. Successes: The automated shore stations program now operates and maintain 3 stations (Scripps Pier, Newport Pier and Santa Barbara Pier) and provide real-time continuous data at 1-4 minute intervals with limited interruptions. Automated shore station data are one of the most requested data sets provided through SCCOOS. These data are used by the public and local state and research agencies to assess local conditions related to water quality, nearshore processes, population dynamics of coastal species and harmful algal blooms.

Marine Operations Milestones

1. Annually provide training to first responders of maritime incidences in the use of SCCOOS products.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: SCCOOS participates in training and science education to a broad range of stakeholders either by request or as opportunity arises.
2. Operate and maintain the network of short, medium and long-range HF radar systems and deliver data streams to the National HFR Network.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: The live feed of HF radar data are now available on the national HFR network for oil and hazardous spill response in the Environmental Response Management Application® (ERMA) map viewer for the southwest region. Near real-time and archived surface current measurements have been used in the National Preparedness for Response Exercise Program (NPREP) drill scenarios led by the U.S. Coast Guard in San Diego, Los Angeles and Ventura.
3. Maintain and expand integrated, customized products with multi-layer views of observations, nowcasts and forecasts. Collaborate with the Port of Long Beach to maximize the benefit of SCCOOS observations.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: The customized, interactive map display of ocean conditions and forecasts for the Port of Los Angeles and Long Beach Harbor is used to improve navigation, safety and efficiency for commercial vessels, harbor pilots and port operations.
4. Deliver surface current data and surface wind analyses to aid spill response, SAR real-time recovery and post analysis trajectories.
 - a. Completion date: TBD - ongoing milestone

- b. Status: On-Track
 - c. Successes: Surface current measurements and surface wind analyses are integrated into the General NOAA Operational Modeling Environment (GNOME) for oil spill trajectory analysis. Customized and expanded interactive map displays of wave and surface currents with multi-layered views of observations, nowcasts, and forecasts were developed for Naval Air Systems Command (NAVAIR), at Point Mugu. Implementation of surface currents measured by the SCCOOS HF radar network are now accessible by U.S. Coast Guard for search and rescue (SAR) applications using their Environmental Data Server.
5. Provide HF Radar Quality Control Development.
- a. Completion date: TBD - ongoing milestone
 - b. Status: On Track
 - c. Successes: A report is underway that aims to explain automated comparisons for IOOS HF Radar quality control. In addition, the team are in the process of obtaining feedback from users to improve the usefulness of the product. There have also been many improvements to the computer running the analysis and the code, once these are complete, more HF radar sites will be added to the product.

2) SCOPE OF WORK

SCCOOS operates as a system of partnerships and projects that are facilitated by technical and programmatic staff. Organized by the four focus areas, the SCCOOS scientific and technical approach is based on a system of core ocean observing technologies and the delivery of useful data products and tools. System components include sub-surface ocean observations from underwater gliders, nearshore and coastal measurements, wave measurements and models, pier-based monitoring, satellite imagery, high frequency (HF) radar surface current mapping and data assimilative ocean modeling. The projects described in this report represent the multi-disciplinary and collaborative efforts of the research teams that contribute data and information to SCCOOS.

3) PERSONNEL AND ORGANIZATION STRUCTURE

Dr. Clarissa Anderson became the Executive Director of SCCOOS on January 1, 2017. Julie Thomas then became a Senior Advisor. Vicky Rowley was hired as a new data management and communications lead on November 27, 2017. Darren Wright will be a backup data manager, and will be helping transition Vicky in her new role.

4) BUDGET ANALYSIS

FY 2017, SCCOOS received an increased allocation of directed funding and a decrease in base funds from FY16. The decrease in base funding (\$104,826) will come out of the data management and communication subsystem. SCCOOS Executive Steering Committee approved the decrease of data management funds.

FY17 funding has provided a valuable investment in important assets and will strengthen regional partnerships and national program planning. SCCOOS will continue providing its core observations and expand data products when possible within budget constraints. SCCOOS is also committed to contributing to larger ocean observing efforts regionally, nationally, and internationally.

Expenditures are progressing as expected, with no major discrepancies between actuals and budgeted on both the main award and the subawards.

Performance Progress Report Addendums

1) Education and Outreach

SCCOOS has [updated](#) the Education and Outreach Inventory.

2) Data Management, Products and Services

a. Open Data Sharing

SCCOOS continues to have the ability to achieve its milestones by providing access to high-quality integrated data and support regional user needs while complying with the standards and protocols for sharing and archiving data that are developed nationally. SCCOOS actively participates in IOOS Data Management efforts such as the Thematic Real-Time Environmental Distributed Data Services (THREDDS). By leveraging the Coastal Data Information Program (CDIP) and the HF Radar National Network programs, SCCOOS targets THREDDS distribution for wave, surface currents and most recently, shore station data. SCCOOS also continues to implement QARTOD data quality control standards. Wave and surface current data have associated XML and FDGC compliant metadata.

SCCOOS has completed a standards-based foundation for DMAC capabilities by converting HF radar and shore station formats into NetCDF and THREDDS.

- SCCOOS has released ncSOS service for its automated and manual shore stations.
- SCCOOS has released ERDDAP service for its existing data sets.
- SCCOOS has leveraged CDIP wave data that are decimated to the NDBC for ingestion into WMO GTS
- SCCOOS has developed a Data Management Plan describing the current status of SCCOOS data streams and future goals for data quality assurance, quality control, dissemination, distribution, and archiving.
- In addition to the Data Management Plan, SCCOOS has developed more detailed descriptions of various data streams and products in the form of Sensor Plans.
- Sensor Plans follow a NOAA Data Sharing Template.
- Sensor Plans have been developed for Gliders, Automated Shore Stations, CalCOFI Cruises, CDIP, HFR, HABs, Manual Shore Stations, Satellite Imagery, AIS and the Burkolator.
- Observations are collected from a variety of platforms in a variety of ways, each of which has its own level of data processing maturity. SCCOOS accepts data from both automated and manual systems via SFTP, HTTP, serial over internet, Webforms and email. Observations are stored in flat files, databases and NetCDF files, all of which are available on the SCCOOS website.

b. Data Management Planning and Coordination

Ongoing program-level participation in data management planning and coordination activities are;

- Darren Wright and Julie Thomas attended the IOOS DMAC meeting in Washington D.C. March 13-17, 2017.
- Sarah Heim & Darren Wright attended a django training workshop on behalf of SCCOOS August 13-18, 2017.
- SCCOOS participated in a IOOS DMAC review on August 3, 2017.
- Julie Thomas and Darren Wright participate in ongoing program-level data management and Julie Thomas is on the committee for IOOS DM standards.
- Julie Thomas participates in the Joint Planning DMAC work groups.
- Julie Thomas is a QARTOD steering team member.
- Julie Thomas presented on a panel entitled, “Efficient & Safe Usage of the Ocean: from MSP to e-navigation” at BlueTech Week.
- Darren Wright and Sarah Heim collaborate regularly with our project scientists on data management tasks that provide high quality data and products while sustaining existing infrastructure, improving data quality control and coordinating efforts with our partners.

- Darren Wright collaborates with the West Coast RA Data Managers to ensure that our west coast wide ocean observing efforts are coordinated.

c. Provision of data to the Global Telecommunication System (GTS)

	WMO GTS	THREDDS	ERDDAP	SOS	IOOS Catalog (DAC)	Web Page	Primary Funder	Operated	Maintained (QC, Archive)
Automated Shore Stations		x	x	x	x	x	SCCOOS	SCCOOS	SCCOOS
Burkolator		x	x	x		x	SCCOOS	SCCOOS	SCCOOS
Gliders	x	x	x		x	x	NOAA/SCCOOS	NOAA/SCCOO	NOAA/SCCOOS
Harmful Algae Blooms						x	SCCOOS	SCCOOS	SCCOOS
High Frequency Radar	x	x		x	x	x	SCCOOS	SCCOOS	SCCOOS
State & Federally Leveraged									
Automated Information System						x	USCG	USCG	USCG
CalCOFI			x			x	NOAA/State of CA/NSF	NOAA/State of CA/NSF	NOAA/State of CA/NSF
CDIP Wave Data	x	x		x	x	x	USACE	CDIP	CDIP
Satellite Data						x	NASA/JPL	NASA/JPL	NASA/JPL

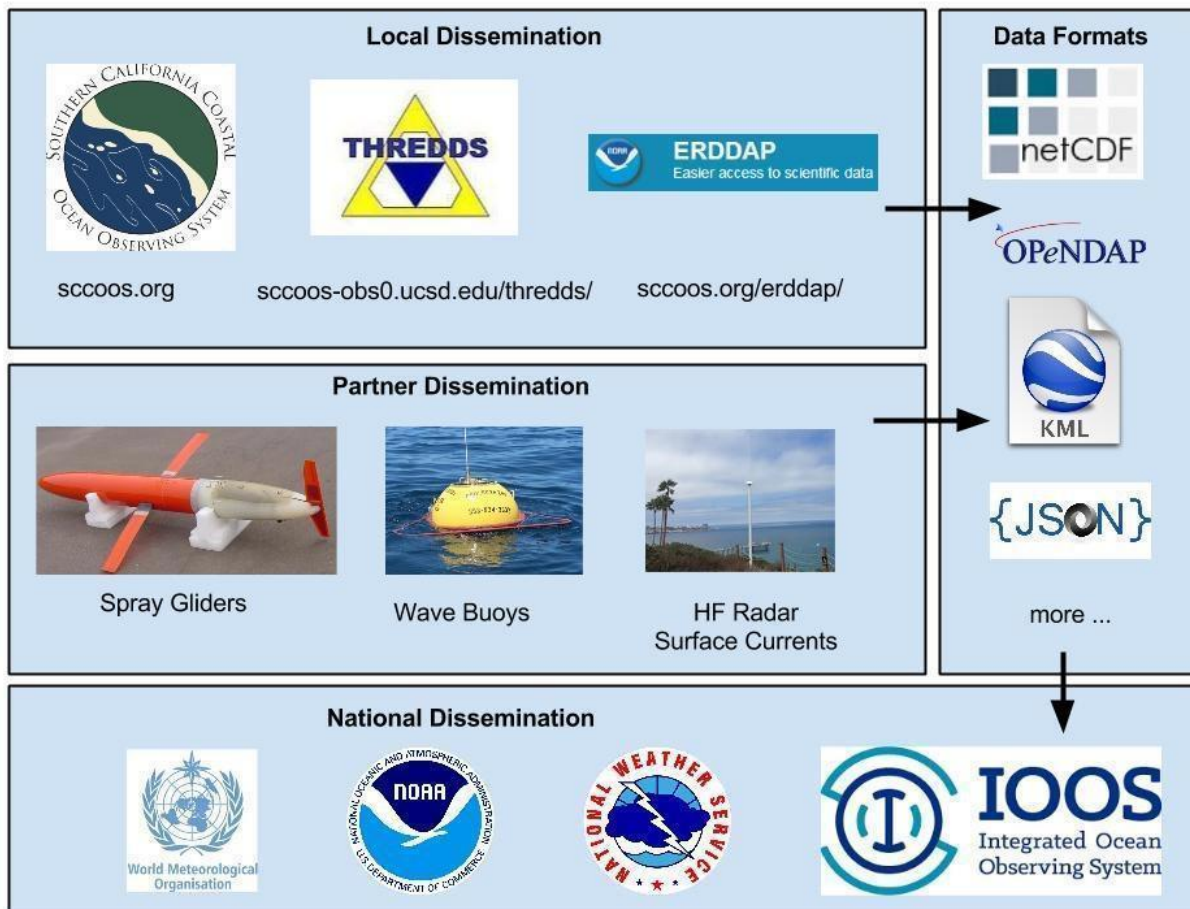
Table 1: Table indicates which communication; web services and access options are available for SCCOOS distributed data.

- SCCOOS has leveraged CDIP wave data that are decimated to the NDBC for ingestion into WMO GTS (See Table 1).
- The HFR, glider, and CDIP wave observations are all transmitted to the National Data Buoy Center for inclusion on the World Meteorological Service Global Telecommunication Service.

d. Data Access Services

See Table 1 above for a breakdown of how SCCOOS data can be accessed. SCCOOS adheres to the NOAA Data Sharing Procedural Directive. All real-time and near real-time data managed by SCCOOS are freely available through open services, without delay or restriction. Avenues for accessing the data include the SCCOOS website: sccoos.org. SCCOOS does not restrict access to any data it collects or serves.

- SCCOOS targets THREDDS distribution for wave, surface currents, shore station data and most recently the Burkolator.
- SCCOOS has completed a standards-based foundation for DMAC capabilities by converting HF radar, shore station, Burkolator, gliders formats into NetCDF and THREDDS.
- All SCCOOS data are publicly available through the SCCOOS website. SCCOOS actively participates in on-going efforts to standardize data distribution through the use of web services such as the Sensor Observation Service and the Open-Source Project for a Network Data Access Protocol (OPeNDAP)/THREDDS.
- As an operational Data Assembly Center, SCCOOS aggregates and manages the integration and distribution of ocean data and products. Serving as a federal repository for physical and biochemical datasets, the Data Assembly Center provides data ingest, analysis, quality control, discovery, access services, visualization and archive. Observational information is made available in a variety of data formats to ensure that products are useful and easy to access, while preserving the necessary detail to support the scientific and educational communities.



Picture 1. Real-time and near real-time data managed by SCCOOS are freely available through open services, without delay or restriction.

e. Catalog Registration

- HFR, gliders, Automated Shore Station and CDIP wave buoys are registered in the IOOS Service Registry. Registration of datasets and services with IOOS provides basic monitoring of service availability and response time.

f. Common Data Formats

- All SCCOOS data are publicly available through the SCCOOS website. The HFR, glider, and CDIP wave observations are all transmitted to the National Data Buoy Center for inclusion on the World Meteorological Service Global Telecommunication Service. SCCOOS actively participates in on-going efforts to standardize data distribution through the use of web services such as the Sensor Observation Service and the Open-Source Project for a Network Data Access Protocol (OPeNDAP)/THREDDS.
- SCCOOS participates with IOOS partners in a highly distributed system of interoperable components.
- Collaboration with international programs such as OceanSITES and the Joint Commission of Oceans and Meteorology (JCOMM) are on-going instructive for CF compliancy and data handling issues.

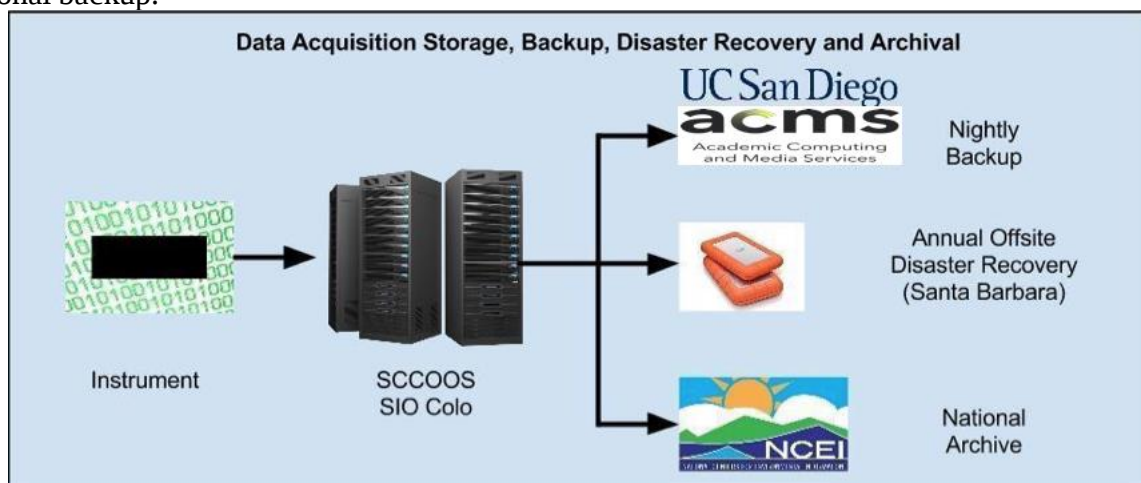
g. Metadata Standards

SCCOOS is regularly in accordance with manufacturer guidance or industry best practice for calibrating, validating, operating, and maintaining equipment owned and/or operated by SCCOOS. Publicly available data are quality controlled at minimum with the following QARTOD required tests: 1) timing, 2) syntax, 3) location, 4) range, 5) climatology. SCCOOS maintains an active role in the ongoing effort to develop and apply QC standards throughout the IOOS Regions. Highly leveraged programs such as

CDIP wave data, HFR network, CalCOFI cruise data, and glider programs manage their own quality control which are compliant with the federal repository data management standards.

h. Storage and Archiving

SCCOOS stores observational data on servers located at Scripp's CoLo data center. SCCOOS operates two enterprise servers running Redhat Operating Service. Each server has dual 18 core Xeon Processors, 128 GB of RAM and a JBOD with 24 Terabyte of storage. Servers are backed-up nightly and copies stored offsite at the University of California San Diego Academic Computing and Media Services. Annual disaster and recovery hard drives are sent to the University of California Santa Barbara for additional backup.



Picture 2. Data acquisition, storage, disaster recovery and archival

There are only two existing datasets that are not archived at NCEI at this time:

- HABs, will be archived by June 2019 at NCEI,
- Burkolator Ocean Acidification, SCCOOS is in discussion with Matt Biddle at NCEI and preparing to submit a request or archive by April 2018.

Presently, Automated Shore Station data, CDIP's wave data, HFR data, Burkolator and glider data are all archived at NCEI. Certain datasets that are registered with the IOOS Service Registry contain FGDC and ISO 19115-2 metadata are available through ERDDAP and THREDDS.

i. Ontologies, vocabularies and common identifiers

Observations are collected from a variety of platforms in a variety of ways, each of which has its own level of data processing maturity. SCCOOS accepts data from both automated and manual systems via SFTP, HTTP, serial over internet, Webforms and email. Observations are stored in flat files, databases and NetCDF files, all of which are available on the SCCOOS website.

j. Consideration for long term operations

SCCOOS Data Management and Communications goals are to develop and maintain the following capabilities:

- Deploy the information system components (including infrastructure and relevant personnel) for full life-cycle management of observations including product creation, public delivery, system documentation, and curation.
- Deliver accurate and timely ocean observations and model outputs to a range of consumers including government, academic, private sector users, and the general public utilizing standardization and specifications common across all providers.
- Establish a robust data exchange that is responsive to a wide breadth of customer requirements and user feedback, assuring the data handling flexibility to accommodate decision-support requirements.

SCCOOS will continue to provide timely access to high-quality integrated data and support regional user needs while complying with the national standards and protocols for sharing and archiving data following the "Guidance for Implementation of the Integrated Ocean Observing System (IOOS) Data

Management and Communications Subsystem”. SCCOOS will also continue to integrate a broad suite of observations in the form of raw data and products. Collaboration with partner RAs to advance stakeholder access to cross-regional data services as defined by commonalities in specified user requirements, is on-going through IOOS Data Management and Communications including workshops and webinars. SCCOOS is well poised to improve ingestion with a level of quality control based on Quality Assurance of Real Time Oceanographic Data (QARTOD) parameters, standardize the web services for all parameters, submit to National Centers for Environmental Information (NCEI) for archive, and enhance data visualization. Additional desired outcomes are described on pages 18-30 of the Strategic Operational Plan.

3) Observing Assets

a) RA Asset Inventory

The RA asset inventory can be found on the [SCCOOS website](#), at the bottom of the page.

b) High Frequency Radar Operations and Maintenance Expenditures

Institution	Expendables	Software	Hardware	Communications	Facilities	Labor	Testing/Collaboration	Data Mgmt /Data Archive	Transportation	Travel	Total
SIO	\$0	\$7,000	\$21,800	\$19,800	\$11,870	\$156,200	\$45,230	\$49,500	\$3,400	\$5,200	\$320,000
USC		\$0	\$2,343	\$0	\$2,343	\$105,393	\$35,981	\$6,051	\$1,555	\$0	\$153,666
UCSB		\$0	\$1,562	\$0	\$2,065	\$207,352	\$55,191	\$19,497	\$1,882	\$0	\$285,987
CalPoly		\$4,155	\$5,986	\$0	\$5,986	\$99,746	\$48,374	\$5,466	\$1,386	\$0	\$166,944

c) HFR Asset Inventory

Station	Network	Frequency	Latitude	Longitude	Location
SDBP	SIO	25.7998	32.535917	-117.122267	Border Field State Park, CA
SDCI	SIO	24.4	32.414067	-117.243733	San Diego, Coronado Islands
SDDP	SIO	25.39981	33.460683	-117.706683	Dana Point, CA
SDPL	SIO	24.799	32.665833	-117.239583	Point Loma, CA
SDSC	SIO	5.23495	32.91775	-118.4869	San Clemente, CA
SDSE	SIO	25.6	33.0245	-117.2861	San Elijo, CA
SDSL	SIO	4.647	32.8694	-117.2532	La Jolla, CA
SDUT	SIO	12.22	33.388383	-117.595683	Upper Trestles, San Diego, CA
SDWW	SIO	25.4	32.679917	-117.247417	Point Loma, CA
SDCP	SIO	25.8	33.218417	-117.405317	Camp Pendleton, CA
SCCI	USC	13.49971	33.44685	-118.478183	Santa Catalina Island, CA
SCDB	USC	25.39971	34.03325	-118.733683	Dan Blocker, CA
SCDH	USC	24.69971	33.933333	-118.442417	Dockweiler, CA
SCNB	USC	25.1	33.606	-117.931417	Newport Beach, CA
SCPF	USC	25.39971	33.704867	-118.293983	Point Fermin, CA
SCTB	USC	25.90029	33.811683	-118.391433	Torrance Beach, CA
COP1	UCSB	13.43965	34.407833	-119.878333	Coal Oil Point, CA
MGS1	UCSB	13.45	34.204883	-119.251633	Mandalay Generating Station, CA
NIC1	UCSB	13.44	34.042433	-118.9153	Nicholas Canyon, CA
PTM1	UCSB	13.55476	34.096117	-119.107367	Point Mugu, CA
RFG1	UCSB	12.2	34.4612	-120.0767	Refugio State Beach, CA
SCI1	UCSB	13.43965	33.994833	-119.631167	Santa Cruz Island, CA
SNI1	UCSB	13.43965	33.2805	-119.52245	San Nicolas Island, CA
SSD1	UCSB	12.164	34.419017	-119.596117	Summerland, CA
AGL1	SLO	4.8	34.576883	-120.649083	Point Arguello, CA
ARG1	SLO	13.49971	34.57695	-120.6505	Point Arguello, CA
DCLR	SLO	4.476	35.217483	-120.862633	Diablo Canyon, CA
DCSR	SLO	13.49971	35.20245	-120.846083	Diablo Canyon, CA
ESTR	SLO	13.49971	35.45975	-120.977633	Point Estero, CA
FBK1	SLO	12.14965	34.86975	-120.6212	Point Sal, CA
LUIS	SLO	13.49971	35.160133	-120.75641	Point San Luis, CA
PTC1	SLO	13.45	34.4483	-120.4717	Point Conception, CA
RAGG	SLO	4.54995	35.787367	-121.33625	Ragged Point, CA
SDBP	SIO	25.7998	32.535917	-117.122267	Border Field State Park, CA

d) HFR Staffing Inventory

Staff Members	(% FTE or #person-months)
Principal Investigators	
Eric Terrill, UCSD/SIO	.4 mo.
John Heidelberg, USC	0 mo.
Libe Washburn, UCSB	1 mo.
Ryan Walter, Cal Poly	0 mo.
Operations Manager	
Lisa Hazard, UCSD/SIO	1 mo.
Technicians/Engineers	
Matt Ragan, USC	10.9 mo.
Thomas Cook, UCSD/SIO	6.05 mo.
C. Garcia-Moreno, UCSD/SIO	6.05 mo.
Matthew Ragan, USC	12 mo.
Eduardo Romero, UCSB	11.4 mo.
Chris Gotschalk, UCSB	5.4 mo.
David Salazar, UCSB	8.4 mo.
Brian Emery, UCSB	1.56 mo.
Ian Robbins, Cal Poly	2.4 mo.
Programmers	
Joseph Chen, UCSD/SIO	1 mo.
Students	
D. Ellis, UCSB	8 mo.
Student asst., Cal Poly	.8mo.

e) Glider Days Inventory

After reviewing the IOOS DAC output, all gliders operating in the SCCOOS region are accounted for, and as per instructions included in the cooperative agreement progress report guidance (updated November 2017), no glider days inventory report is necessary.

Environmental Compliance

1) First Responder Training

IOOS/NOAA determined this project has a categorical exclusion, and their statement is as follows:

The aforementioned project will not result in any changes to the human environment. As defined in Section 6.03c3(d), Administrative r Routine Program Functions, of NAO 216-6, this project involves conference room and/or classroom training activities that hold no potential for significant environmental impacts. As such, they should be categorically excluded from the need to prepare an Environmental Assessment or an Environmental Impact Statement.

2) Gliders

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows:

It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

3) Shore Stations

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows:

It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential

impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

4) Vessel Sampling – CalCOFI

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows:

It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

5) Mooring

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows:

It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

The project and its potential impact may be limited through the following terms or conditions placed on receipt of NOAA funds:

- A permit is in place to allow the mooring to reside in its location: 1) Aid to navigation application; 2) Aid to navigation addendum; and 3) FCC Experiment License valid until 2017. The applicant must provide copies of these permits to the IOOS Office for the EC File of Record prior to undertaking the Del Mar Mooring Activities under the subject award.
- SCCOOS has implemented the Essential Fish Habitat Conservation Recommendations provided by NMFS on July 7, 2014 to avoid, minimize, or offset effects of this activity.

**United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
RADIO STATION CONSTRUCTION PERMIT
AND LICENSE**

EXPERIMENTAL

(Nature of Service)

XR FX

(Class of Station)

WI2XAA

(Call Sign)

0539-EX-PL-2015

(File Number)

NAME Scripps Institution Of Oceanography

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(d) of the Commission's Rules

Station Locations

- (1) Santa Barbara Channel, within 32 km, PC - NL 34-18-31; WL 120-48-15
- (2) Pacific Ocean,, within 32 km, PC - NL 33-31-41; WL 122-30-15
- (3) Pacific Ocean, within 32 km, PC - NL 32-55-48; WL 117-18-57

Frequency Information

Santa Barbara Channel, within 32 km, PC - NL 34-18-31; WL 120-48-15

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

Pacific Ocean,, within 32 km, PC - NL 33-31-41; WL 122-30-15

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

This authorization effective November 09, 2017 and
will expire 3:00 A.M. EST November 01, 2019

**FEDERAL
COMMUNICATIONS
COMMISSION**



Frequency Information

Pacific Ocean, within 32 km, PC - NL 32-55-48; WL 117-18-57

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

Special Conditions:

- (1) The occupied bandwidth of the emission shall not extend beyond the band limits set forth above.