Automated Shore Station Sensor Plan

May 8, 17

Background

The SCCOOS automated shore stations consist of a suite of sensors that are mounted on and cabled to a processing computer on the pier. All of these automated sensors measure temperature, salinity, chlorophyll and pressure at frequent intervals in the nearshore coastal ocean.

Locations of the stations are as follows:

1.) Stearns Wharf - Operated and maintained by the Marine Institute at the University of California, Santa Barbara. The instrument package is mounted at a nominal depth of 2 meters Mean Lower Low Water (MLLW). Historical data has been collected continuously since August 16, 2005.

2.) Santa Monica Pier – DECOMMISIONED. Previously operated by the Scripps Institution of Oceanography (SIO) in collaboration with Institute of the Environment at the University of California, Los Angeles. The instrument package is mounted at a nominal depth of 2 meters MLLW. Historical data have been collected from April 4, 2005 to January 1, 2016.

3.) Newport Pier - Operated by SIO in collaboration with Orange County Sanitation District. The instrument package is mounted at a nominal depth of 2 meters MLLW. Historical data have been collected continuously since February 10, 2005.

4.) Scripps Pier - Operated by SIO. The instrument package is mounted at a nominal depth of 5 meters MLLW. Historical data has been collected continuously since April 4, 2005.

Data Ingestion

The automated shore station instrument package includes a Seabird SBE 16plus SeaCAT Conductivity, Temperature, and Pressure recorder, and a WetLabs WetSTAR Chlorophyll Fluorometer with a 0-75 ug/L range. Data are captured using a serial-to-Ethernet server which transmits the data to SCCOOS server for processing, dissemination and archival every 4-6 minutes.

Data Management

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Data are managed by a process on the SCCOOS server which listens on a specified port for incoming serial data. Raw serial data are time stamped and written to daily ASCII files, and subsequently written to a MySQL database. Another background process checks every 2 minutes for new data, appending to a yearly NetCDF file. QARTOD quality control is applied with the appropriate flags.

Data Distribution

Data are available every 4-6 minutes.

Access to Data (http://sccoos.org/data/autoss/)

1. SCCOOS THREDDS server: http://sccoos.org/thredds/catalog.html
2. SCCOOS ERDDAP server: http://sccoos.org/erddap/

Quality Control

For all parameters (temperature, salinity, pressure, chlorophyll), automated quality control are implemented and further described at http://sccoos.org/about/dmac/autossqc/

	Temperature	Conductivity	Salinity	Pressure	Chlorophyll	Notes
Timing/Gap						30 min max, notification UCSB
Syntax	Yes	Yes	Yes	Yes	Yes	
Location						Does not apply to fixed deployments
Gross Range	8 to 30 C Suspect -5 to 30 C Bad	0 to 9 s/m Bad	30 to 34.5 psu Suspect 2 to 42 psu Bad	1 to 6 dbar Suspect 0 to 20 dbar Bad	0.02 to 50 ug/L Bad	
Spike	2 C Suspect 3 C Bad	Not applied	0.4 psu Suspect 0.5 psu Bad	4 dbar Suspect 5 dbar Bad	0.8 ug/L Suspect 1.0 ug/L Bad	
Climatology	8 to 30 C	0 to 9 s/m	30 to 34.5 psu	1 to 7 dbar		Applied in gross range
Rate of Change / Current Gradient						TBD
Flat Line	2 reps Suspect 5 reps Bad eps 0.0001C	2 reps Suspect 5 reps Bad eps 0.00005 s/m	3 reps Suspect 5 reps Bad eps 0.00004 (0.4ppm)	2 reps Suspect 5 reps Bad eps 0.0005 (0.004% of full scale)	2 reps Suspect 5 reps Bad eps 0.001 ug/L (0.01 ug/L = 0.001 raw units)	

The table below has been reproduced with descriptions of the QC tests.

Timing/Gap Test – Check for arrival of data. (30 minute max)

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Syntax Test – Check to ensure that the message is structured properly.
Location Test – Check for reasonable geographic location. (Does not apply to fixed deployments)
Gross Range Test – Data point exceeds sensor or operator – selected min/max.
Spike Test – Data point n-1 exceeds a selected threshold relative to adjacent data points.
Climatology Test – Test that data point falls within seasonal expectations. (Applied in gross range)
Range of Change Test – Excessive rise/fall test. (Not implemented)
Flat Line Test – Invariant value.

The following parameters are using QARTOD:

- Temperature and salinity (http://www.ioos.noaa.gov/qartod/temperature_salinity/welcome.html)
- Pressure (https://www.ioos.noaa.gov/wp-content/uploads/2016/04/qartod_wave_data_manual.pdf)

The following parameter uses "best practices thresholds" established by the SCCOOS Principal Investigators:

- Chlorophyll (spike, range, flat line, syntax tests)

In the absence of QARTOD guidelines for certain biological parameters like chlorophyll, the SCCOOS PIs have helped us determine regional thresholds to apply to quality control of the chlorophyll data at our automated shore stations. The spike and range tests are informed by historical statistics of the regional chlorophyll time series and reflect the regional variability/variance. QC best practices are followed. QA best practices follow NIST-traceable standards for the fluorometric measurements.

Quality Control tests are implemented with code developed at IOOS https://github.com/ioos/qartod

Daily raw files are run through quality control and appended with quality control flags to yearly NetCDF files. These NetCDF files are available from http://sccoos.org/thredds/ and http://sccoos.org/erddap/

Archiving

SCCOOS automated shore station data are maintained, curated and archived at SIO and the University of California, San Diego Supercomputer Center.

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National Centers for Environmental Information (NCEI) archive: Completed as of 9/6/16.
NCEI Submission Information Form: http://sccoos.org/documents/home/archive/

Metadata/ documentation are submitted alongside the data or created on deposit/ transformation in order to make the data reusable. The metadata are available in multiple formats, ASCII FGDC, XML FGDC. ISO 19115-2 metadata are available, on the following link: http://sccoos.org/thredds/autoss/catalog.html.

Permission Restrictions

Current funding is provided by the National Oceanic and Atmospheric Administration (NOAA). When used for web displays and online resources, please provide a link to the SCCOOS homepage. For instance, in standard html:

Data courtesy of SCCOOS

For offline references, please choose the appropriate form from the recommended acknowledgements below.

- Short form (figure captions, etc.)

"... data from SCCOOS"

- Longer form (in text)

"...data were furnished by the Southern California Coastal Ocean Observing System."

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"...data were furnished by the Southern California Coastal Ocean Observing System (SCCOOS), a regional partner of the United States Integrated Ocean Observing System (IOOS®)."

Intellectual Property Rights

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