

Jacques Cousteau (JAC) NERR Meteorological Metadata
January 1, 2013 – December 31, 2013
Latest Update: April 7, 2014

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the CDMO (cdmosupport@belle.baruch.sc.edu) or Reserve with any additional questions.

I. Data Set and Research Descriptors

1) Principal investigator and contact persons

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2) Entry verification

Data are uploaded from the CR1000 data logger to a Personal Computer (IBM compatible). Files are exported from LoggerNet in a comma-delimited format and uploaded to the CDMO where they undergo automated primary QAQC and become part of the CDMO's online provisional database. During primary QAQC, data are flagged if they are missing, out of sensor range. The edited file is then returned to the Reserve where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, append files, and export the resulting data file to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online

database. For more information on QAQC flags and QAQC codes, see Sections 11 and 12.

SWMP technician Gina Petruzzelli and RSC Marine Field Station manager Steven Evert collected; QA/QC checked and compiled 2013 weather data per CDMO procedures. Raw data files were collected weekly and backed up to disc and a secondary hard drive. Pre-processing macros were run on a dedicated met station computer. All data was backed up to secondary hard drive, disc and remote servers.

3) Research objectives

The principal objective is to record long-term meteorological data for the JC NERR in order to observe any environmental changes or trends over time. A major component of the JCNERR SWMP program is the monitoring of estuarine water quality. The close coupling between meteorological conditions and estuarine water quality has necessitated the monitoring of atmospheric conditions in the system as well. The meteorological data collected at the Reserve site thus provide valuable information on the atmospheric influences on water quality in the JCNERR system.

4) Research methods

Campbell Scientific data telemetry equipment was installed at the Nacote Creek Meteorological station on 11/15/05 and transmits data to the NOAA GOES satellite, NESDIS ID #3B00D112. (Where 3B00D112 is the GOES ID for that particular station.) The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The “real-time” telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO’s authoritative online database. Provisional and authoritative data are available at <http://cdmo.baruch.sc.edu>.

Data Collection Schedule:

The 15 minute Data are collected in the following formats for the **CR1000**:

Averages from 5-second data:

Air Temperature (°C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction (degrees), Battery Voltage (volts)

Maximum and Minimum Air Temperature (°C) and their times from 5-second data (these data are available from the Reserve)

Maximum Wind Speed (m/s) and time from 5-second data

Wind Direction Standard Deviation (degrees)

Totals:

Precipitation (mm), PAR (millimoles/m²), and Cumulative Precipitation (mm)

Recommended calibration frequency for the MET station sensors:

- Temperature/Humidity- annual recalibration
- Rain Gauge- annual recalibration
- Wind Speed/Direction- annual or bi-annual inspection (depending on the sensor)
- Barometric Pressure- bi-annual recalibration
- PAR- bi-annual recalibration
- CR1000-every 5 years (required beginning 2014, one year initial grace period)

5) Site location and character

The Jacques Cousteau National Estuarine Research Reserve (JCNERR) at Mullica River/Great Bay is located on the northeast coast of the United States on the Atlantic Ocean. The estuary is near Tuckerton, New Jersey about 14 kilometers north of Atlantic City. The met station is located adjacent to Nacote Creek, a tributary of the Mullica River. The site is approximately 14.3 kilometers WSW of Little Egg Inlet, the primary saltwater influence of the JC NERR. The met station is located on property owned by the RSC Marine Science and Environmental Field Station in Port Republic, NJ, approximately 1.8 kilometers south of the Chestnut Neck marina on the Mullica River and 0.4 kilometers northeast of Rt. 9 in Port Republic, NJ.

GPS coordinates: N 39 degrees, 32 minutes, 06 seconds
 W 74 degrees, 27 minutes, 49 seconds

The nearest long term water quality monitoring station is located at Chestnut Neck Marina, approximately 1.8 kilometers North of the met station. Water quality data (currently not included in the JAC NERR SWMP program) for Nacote Creek is at a site adjacent to the met station. The unit is mounted on a 13-meter tower adjacent to the Nacote Creek, approximately 20 m from the high tide line. The elevations above the marsh surface are as follows; Barometric pressure - 2.2 m, temperature and relative humidity - 2.9 m, PAR - 4.5 m, wind – 12.5 m, highest point on tower (lightning rod) - 14 m. The rain gauge is approximately 2.1 m above the surface and 1.5 m north of the tower. The area is sparsely covered with clam shell debris and upland grasses.

Typical weather patterns for the New Jersey Coast include afternoon sea breezes (SW) and near still winds from midnight until shortly after sunrise during the summer months. Major weather events typically include 2-3 day duration periods of ENE winds and significant cold fronts from October through March. These cold fronts typically bring extended periods of increased NW winds commonly reaching 25-40 knots.

6) Data collection period

The meteorological monitoring program was started in October 2002 at the JCNERR. The Reserve has a long-standing program in the collection of water quality data and other meteorological data, which is available at the Rutgers University Marine Field Station before October 2002 by contacting the Research Coordinator listed above. The 2013 data collection interval spanned from January 1, 2013 at 00:00 to December 31, 2013 at 23:45.

7) Distribution

NOAA/ERD retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The PI retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the PI and NERR site where the data were collected will be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. Manuscripts resulting from this NOAA/OCRM supported research that are produced for publication in open literature, including refereed scientific journals, will acknowledge that the research was conducted under an award from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR weather data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal investigators and contact persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page <http://cdmo.baruch.sc.edu/>. Data are available in comma separated format.

8) Associated researchers and projects

The meteorological data collected in the SWMP program of JCNERR are important to assess migration patterns of key species found in the Mullica River-Great Bay Estuary, Little Egg Harbor, and other contiguous waters. Included here are the

seasonal movements of striped bass (*Morone saxatilis*), bluefish (*Pomatomus saltatrix*) and summer flounder (*Paralichthys dentatus*). The meteorological data are also important for studies of the population dynamics of shellfish species, notably the hard clam (*Mercenaria mercenaria*) and blue crab (*Callinectes sapidus*). Furthermore, the data are valuable for evaluating environmental conditions that influence benthic communities, both those inhabiting soft sediments and living attached to hard surfaces (i.e., epibenthos). One of the most important areas of study for the coastal bay waters of Little Egg Harbor is dealing with submerged aquatic vegetation (*Zostera marina* and *Ruppia maritima*). A major concern is the health and vitality of the SAV, and how the beds in the bay are affected by natural factors (e.g., storms, unusual temperature conditions, reduced dissolved oxygen, etc.) and anthropogenic influences. All of the aforementioned studies are either underway or scheduled for future work. In addition to meteorological monitoring, JAC NERR also monitors water quality and nutrient data as part of SWMP. These data are available online at <http://cdmo.baruch.sc.edu/>.

II. Physical Structure Descriptors

9) Sensor specifications – Include parameter description, units, sensor type, model #, (operating temperature), range of measurement, accuracy, (temperature dependence), (sensitivity), (stability), serial numbers, multipliers, date of last calibration, and dates in use for each sensor (**include at a minimum the sensors installed for the year covered by this metadata document**) and CR1000 description. *Ensure that sensor information is accurate for your weather station.*

Parameter: LI-COR Quantum Sensor #1

Units: mmol m⁻² (total flux)

Sensor type: High stability silicon photovoltaic detector (blue enhanced)

Model #: LI190SB

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

Stability: <±2% change over 1 yr

Operating Temperature: -40°C to 65°C; Humidity: 0 to 100%

Sensitivity: typically 5 µA per 1000 µmol s⁻¹ m⁻²

Serial Number: Q32195

Date of Last Calibration: 7/6/2011

Dates of Sensor Use: 8/16/2012- current as of 12/31/2013

Parameter: Wind speed Sensor #1

Units: meter per second (m/s)

Sensor type: 18 cm diameter 4-blade helicoids propeller molded of polypropylene

Model #: R.M. Young 05103 Wind Monitor

Range: 0-60 m/s (134 mph); gust survival 100 m/s (220 mph)

Accuracy: +/- 0.3 m/s

Serial Number: WM48915

Date of Last Calibration: 07/07/2011

Dates of Sensor Use: 8/16/2012- 09/10/2013

Serial Number: WM56138
Date of Calibration: 05/28/2013
Dates of Sensor Use: 09/10/2013 – current as of 12/31/2013

Parameter: Wind direction Sensor #1
Units: degrees
Sensor type: balanced vane, 38 cm turning radius
Model #: R.M. Young 05103 Wind Monitor
Range: 360° mechanical, 355° electrical (5° open)
Accuracy: +/- 3 degrees
Serial Number: WM48915
Date of Last Calibration: 07/07/2011
Dates of Sensor Use: 8/16/2012- 09/10/2013

Serial Number: WM56138
Date of Calibration: 05/28/2013
Dates of Sensor Use: 09/10/2013 – current as of 12/31/2013

Parameter: Temperature Sensor #1
Units: Celsius
Sensor type: Platinum resistance temperature detector (PRT)
Model #: HMP45C Temperature and Relative Humidity Probe
Operating Temperature: -40°C to +60°C
Range: -40°C to +60°C
Accuracy: ± 0.2 °C @ 20°C
Serial Number: Y1541089
Date of Last Calibration: 07/11/2011
Dates of Sensor Use: 8/16/2012- 09/10/2013

Serial Number: X1130013
Date of Calibration: 04/25/2013
Dates of Sensor Use: 09/10/2013 – current as of 12/31/2013

Parameter: Relative Humidity Sensor #1

Units: Percent

Sensor type: Vaisala HUMICAP© 180 capacitive relative humidity sensor

Model #: HMP45C Temperature and Relative Humidity Probe

Range: 0-100% non-condensing

Accuracy at 20°C: +/- 2% RH (0-90%) and +/- 3% (90-100%)

Temperature dependence of RH measurement: +/- 0.05% RH/°C

Serial Number: Y1541089

Date of Last Calibration: 07/11/2011

Dates of Sensor Use: 8/16/2012- 09/10/2013

Serial Number: X1130013

Date of Calibration: 04/25/2013

Dates of Sensor Use: 09/10/2013 – current as of 12/31/2013

Parameter: Barometric Sensor #1

Units: millibars (mb)

Sensor type: Vaisala Barocap © silicon capacitive pressure sensor

Model #: CS-105

Operating Range: Pressure: 600 to 1060 mb; Temperature: -40°C to +60°C;

Humidity: non-condensing

Accuracy: ± 0.5 mb @ 20°C; +/- 2 mb @ 0°C to 40°C; +/- 4 mb @ -20°C to 45°C; +/- 6 mb @ -40°C to 60°C

Stability: ± 0.1 mb per year

Serial Number: Y1430012

Date of Last Calibration: 07/12/2011

Dates of Sensor Use: 8/16/2012- 09/10/2013

Serial Number: W2540007

Date of Calibration: 05/20/2013

Dates of Sensor Use: 09/10/2013 – current as of 12/31/2013

Parameter: Precipitation Sensor #1

Units: millimeters (mm)

Sensor type: Tipping Bucket Rain Gauge

Model #: TE525

Rainfall per tip: 0.01 inch

Operating range: Temperature: 0° to 50°C; Humidity: 0 to 100%

Accuracy: +/- 1.0% up to 1 in./hr; +0, -3% from 1 to 2 in./hr; +0, -5% from 2 to 3 in./hr

Serial Number: 525

Date of Calibration: 09/15/2013

Dates of Sensor Use: 08/26/2011 – current as of 12/31/2013

CR1000

The CR1000 has two MB Flash EEPROM that is used to store the Operating System. Another 128 K Flash is used to store configuration settings. A minimum of 2 MB SRAM is (4 MB optional) is available for program storage (16K), operating system use, and data storage. Additional storage is available by using a compact flash card in the optional CRM100 Compact Flash Module. The CR1000 was added on November 10, 2006.

A GOES transmitter was added on November 15, 2005. The satellite antenna is oriented to 192 degrees North magnetic and activates the transmitter at 39:50 after the hour for a 10 second period. The telemetry is “Provisional” data and not the “Authentic” Dataset used for long term monitoring and study. This data can be viewed by going to <http://cdmo.baruch.sc.edu>

Date CR1000 Calibrated: has not been calibrated since installation

CR1000 Firmware Version (s): CR1000 running OS19

CR1000 Program Version(s): jacncmet_5.5_081612

10) Coded variable definitions

Sampling station: Sampling site code: Station code:

Nacote Creek NC jacncmet

11) QAQC flag definitions – This section details the automated primary and secondary QAQC flag definitions.

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter’s associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is above or below sensor range, or missing. All remaining data are then flagged 0, as passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

- 5 Outside High Sensor Range
- 4 Outside Low Sensor Range
- 3 Data Rejected due to QAQC
- 2 Missing Data
- 1 Optional SWMP supported parameter
- 0 Passed Initial QAQC Checks
- 1 Suspect Data

- 2 *Open - reserved for later flag*
- 3 *Open - reserved for later flag*
- 4 Historical Data: Pre-Auto QAQC
- 5 Corrected Data

12) QAQC code definitions – This section details the secondary QAQC Code definitions used in combination with the QAQC flags above.

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the CR1000, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors

GIM	Instrument Malfunction
GIT	Instrument Recording Error, Recovered Telemetry Data
GMC	No Instrument Deployed due to Maintenance/Calibration
GMT	Instrument Maintenance
GPD	Power Down
GPF	Power Failure / Low Battery
GPR	Program Reload
GQR	Data Rejected Due to QA/QC Checks
GSM	See Metadata

Sensor Errors

SDG	Suspect due to sensor diagnostics
SIC	Incorrect Calibration Constant, Multiplier or Offset
SIW	Incorrect Wiring
SMT	Sensor Maintenance
SNV	Negative Value
SOC	Out of Calibration
SQR	Data rejected due to QAQC checks
SSD	Sensor Drift
SSN	Not a Number / Unknown Value
SSM	Sensor Malfunction
SSR	Sensor Removed

Comments

CAF	Acceptable Calibration/Accuracy Error of Sensor
CDF	Data Appear to Fit Conditions
CML	Snow melt from previous snowfall event

CRE*	Significant Rain Event
CSM*	See Metadata
CCU	Cause Unknown
CVT*	Possible Vandalism/Tampering
CWE*	Significant weather event

13) Other remarks/notes

Data are missing due to equipment or associated specific sensors not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NaNs in the dataset stand for “not a number” and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

Small negative PAR values are within range of the sensor and are due to normal errors in the sensor and the CR1000 Datalogger. The Maximum signal noise error for the Licor sensor is +/- 2.214 mmol/m² over a 15 minute interval.

Relative Humidity data greater than 100 are within range of the sensor accuracy of +/-3%.

Data recorded for all parameters (with the exception of cumulative precipitation) at the midnight timestamp (00:00) are the 15 minute averages and totals for the 23:45-23:59 time period of the previous day. Cumulative precipitation data at the midnight timestamp (00:00) are the sum of raw (unrounded) precipitation data from 00:00 to 23:59 of the previous day. Summing each individual 15-minute total precipitation value from the same period will result in small differences from cumulative precipitation due to rounding. It is especially important to note how data at the midnight timestamp are recorded when using January 1st and December 31st data.

From 01/01/2013 to 09/10/2013 wind direction is off by undetermined degrees. Will correct once sensors change.

01/10/2013 14:30 to 01/14/2013 17:45 Power outage due to Superstorm Sandy related repairs.

Various times data has been rejected from the TOTPAR data because this data does not fit in acceptable limits, with no physical reason seen on the sensor.

04/25/2013 01:00 – 05:15, 04/25/2013 20:45 – 23:45, 04/26/2013 00:00 – 03:15

04/26/2013 19:15 – 23:15, 04/27/2013 01:30 – 04:45, 04/27/2013 21:15 – 23:45

04/28/2013 00:00 – 02:00, 04/29/2013 02:00 – 02:30, 05/05/2013 19:30 – 23:45,
05/06/2013 00:00 – 01:45, 05/06/2013 21:30 – 21:45, 06/06/2013 23:00

Relative humidity marked CAF on 02/06/2013 06:30- 08:15 reading 101 no reason why.

Various times and data that PAR data is suspect all have been check and are within limits.

01/01/2013, 01/02/2013, 01/03/2013, 01/04/2013, 01/05/2013, 01/06/2013, 01/07/2013, 01/08/2013, 01/09/2013, 01/10/2013, 01/14/2013, 01/15/2013, 01/16/2013, 01/17/2013, 01/18/2013, 01/19/2013, 01/20/2013, 01/21/2013, 01/24/2013, 01/26/2013, 01/27/2013, 01/29/2013, 01/31/2013, 02/01/2013, 02/02/2013, 02/03/2013, 02/04/2013, 02/05/2013, 02/06/2013, 02/07/2013, 02/08/2013, 02/09/2013, everyday till the end of feb in the evening hours. 03/08/2013, everyday till the end of March in the evening hours.

04/01/2013, 04/02/2013 – 04/07/2013, 04/10/2013, 04/13/2013, 04/14/2013, 04/18/2013, 04/19/2013- 04/26/2013, 05/01/2013 – 05/07/2013, 05/11/2013, 05/13/2013, 05/14/2013, 05/18/2013, 05/23/2013, 05/26/2013, 06/05/2013, 06/06/2013, 06/10/2013, 06/16/2013, 06/19/2013, 06/21/2013

07/02/2013 19:45, 07/09/2013 21:30, 07/20/2013 23:15, 10/04/2013, 10/05/2013, 10/06/2013, 10/09/2013, 11/5/2013, 11/07/2013, 11/08/2013, 11/09/2013, 11/10/2013, 11/11/2013, 11/13/2013, 11/14/2013, 11/15/2013, 11/16/2013, 11/18/2013, 11/19/2013, 11/20/2013, 11/21/2013, 11/22/2013, 11/24/2013, 11/25/2013, 11/26/2013, 11/29/2013, 11/30/2013, 12/03/2013, 12/06/2013, 12/07/2013, 12/08/2013, 12/10/2013, 12/11/2013, 12/12/2013, 12/13/2013, 12/16/2013, 12/18/2013, 12/19/2013, 12/20/2013, 12/21/2013, 12/22/2013, 12/23/2013, 12/25/2013, 12/26/2013, 12/27/2013, 12/28/2013.

Wind, RH, Temp, BP sensors were all switched out on September 10, 2013

Powered down from 09/10/2013 08:15-09:30.

09/10/2013 08:15 -09:30 GMT for sensor swap

09/10/2013 9:45-11:15 marked suspect data from power of new sensors