Jacques Cousteau (JAC) NERR Meteorological Metadata
January 1, 2007 – December 31, 2007
Latest Update: July 28, 2009

I. Data Set & Research Descriptors

1) Principal investigator & contact persons

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2) Entry verification

a) Data Input Procedures

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 or 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 Robert Scahill and RSC Marine Field Station manager Steven Evert collected; QA/QC checked and compiled 2007 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.

b) Data Collection Schedule

i) Data is collected in the following formats.
(1) Sample data points are collected every 15 minutes.

ii) 15 minute average parameters:
Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, Rainfall (mm)

iii) 15 minute minimum & maximum parameters:
Date, Time, Air Temperature (c), Time, Wind Speed (m/s) –max only, Time

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

The Campbell Scientific weather station samples every 5 seconds to produce 15 minute averages of those measurements of air temperature, relative humidity, barometric pressure, rainfall, wind speed and wind direction. The CR1000 datalogger can store over two weeks of data before it overwrites the data. If the modem link failed and data could not be collected from the datalogger to the computer the data would be downloaded from the CR1000 to a laptop computer. Monthly, sensors on the weather station are inspected for damage or debris. If any is found, it is repaired and/or cleaned. Sensors are removed and sent back to Campbell Scientific for calibration at a minimum of every two years, depending on sensor specifications.

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.

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 JC 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 2007 data collection interval spanned from January 1, 2007 at 00:00 to December 31, 2007 at 23:45.

7) Distribution

According to the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program,

> 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 the 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/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 Section 1, 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 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.

II. Physical Structure Descriptors

9) Sensor specifications

Parameter: LI-COR Quantum Sensor #1
Units: mmoles 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 µmoles s-1 m-2
Date of last calibration: April 20, 2007
Put into service: September 6, 2007
S/N: Q32195

Parameter: Wind speed #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
Date of last calibration: April 21, 2007
Put into service: September 6, 2007
S/N: WM48915

Parameter: Wind direction #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
Date of last calibration: April 21, 2007
Put into service: September 6, 2007
S/N: WM48915

Parameter: Temperature #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
Date of Last calibration: April 24, 2007
Put into service: September 6, 2007
S/N: Y1540089

Parameter: Relative Humidity #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
Date of Last calibration: April 24, 2007
Put into service: September 6, 2007
S/N: Y1540089

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
Date of Last calibration: April 26, 2007
Put into service: September 6, 2007
S/N: Y1430012

Parameter: Precipitation #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
Date of Last calibration: September 6, 2007

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.

10) Coded variable definitions

Sampling station:	Sampling site code:	Station code:
Nacote Creek	NC	jacncmet

11) 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

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 deployment or YSI datasonde, 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.

General Errors

GIM	Instrument Malfunction
GMT	Instrument Maintenance

GPF Power Failure / Low Battery
GQR Data Rejected Due to QA/QC Checks
GPR Program Reload
GPD Power Down

Sensor Errors

SIC Incorrect Calibration Constant, Multiplier or Offset
SSN Not a Number / Unknown Value
SNV Negative Value
SOC Out of Calibration
SSM Sensor Malfunction
SSR Sensor Removed

Comments

CAF Acceptable Calibration/Accuracy Error of Sensor
CDF Data Appear to Fit Conditions
CRE Significant Rain Event
CSM See Metadata

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. 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 mmoles/m2 over a 15 minute interval.

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

For unknown reasons, Relative Humidity data on 11/14/2007 from 8:45-9:30 and 12/14/2007 from 8:00-11:45 are out of sensor range and were rejected.

There was a slight increase in PAR readings after 9/7/2007. This was due to switching to a freshly calibrated sensor

Precipitation data during periods of at or near 0 degrees Celsius may be suspect due to the potential freezing of the mechanical rain gauge.