

North Carolina (NOC) National Estuarine Research Reserve
Research Creek Meteorological Metadata Report
January - December 2007
Latest Update: December 1, 2009

I. Data Set and Research Descriptors

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2. Entry verification

Data are uploaded from the CR1000 data logger to a Personal Computer and/or Compact Flash memory card (IBM compatible). Files are exported from PC208W or 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. Anomalous data are investigated and noted in the Other Remarks/Notes section. Any data corrections that are performed are also noted in the Other Remarks / Notes section below.

The most common reported errors/anomalies in 2007 are relative humidity values over 100%. Due to a CF memory card reader malfunction, data collected for the time period:

08-15-07 10:00 to 09-27-07 13:15, was obtained from the CDMO export site instead of downloading via laptop or memory card. All flags are double checked with other data that could support such "anomalous" weather changes and were noted in the sections that follow. For more information on QAQC flags and QAQC codes, see Sections 11 and 12.

Heather Wells and Byron Toothman are responsible for all data management and QA/QC of the 2007 MET data.

3. Research Objectives

The principal objectives are to establish long-term monitoring of the weather in the vicinity of Masonboro Island, to obtain better data on storms and to be able to correlate the weather, water quality, chlorophyll and nutrient data. In addition, the weather data collected will be used in support of other ongoing projects within the Reserve and nearby area.

4. Research methods

Campbell Scientific data telemetry equipment at the Research Creek station transmits data to the NOAA GOES satellite, NESDIS ID #3B02028E. 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 are periodically compared to values recorded by other local weather stations to verify accuracy. Data are also quality checked using Excel. The data and graphs of meteorological data are reviewed. Anomalous data and errors are further investigated and data are corrected, rejected (if necessary) or left unchanged and flagged and coded appropriately (see sections 11 and 12).

The weather station and sensors are inspected monthly for cleaning and/or repair. Sensors are replaced and/or calibrated according to the manufacturer's guidelines (annually or biannually).

5. Site Location and Character:

The components of North Carolina's National Estuarine Research Reserve (from north to south) are: Currituck Banks, Rachel Carson, Masonboro Island, and Zeke's Island. They are located along the southeast Atlantic coast of the United States. Currently, only data from Masonboro Island and Zeke's Island components are transferred to the CDMO.

The meteorological site is located on Masonboro Island, 2.09 km from the NOC

NERR lab, and approximately 76.2 meters from the Research Creek water quality deployment site. The weather station is located on an active dredge spoil island adjacent to Research Creek east of the Intracoastal Waterway. It is directly across the Intracoastal Waterway from Whiskey Creek, at 34° 9.328'N, 77° 51.054'W. The station sits at an elevation of approximately 4.88 m above sea level, slightly offset from the highest point of the spoil, which has a maximum elevation of approximately 5.8 m. The site has scrub surrounding the periphery, and grassy cover in the central areas. The weather station consists of a 3-meter aluminum tower that holds the wind sensor (wind speed and direction) at a height of 3.68 m and the Li-COR sensor at a height of 3.66 m. The temperature and relative humidity sensor is mounted on the tower at 2.39 m and the barometric pressure sensor, which is inside of the datalogger housing, is mounted at a height of 1.75 m. The rain gauge is located on a separate platform 7.62 m east south east of the tower and is mounted at a height of 1.79 m. The sensors were wired to the CR1000 (Campbell datalogger) according to the protocol in the Meteorological Monitoring SOP. There are no surrounding objects that obstruct or shade the weather station.

6. Data collection period

Collection of meteorological data began on 15 March 1997 and continues through the present. Instruments were deployed prior to this date; however, data were for initial testing and verification of functions, and have since been discarded. The data collection period for 2007 began on January 1 at 00:00 and ended December 31 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

Meteorological data will be used to augment other research components of the System Wide Monitoring Program (SWMP) that currently include water quality, chlorophyll and nutrient monitoring. The principal objective of the water quality monitoring is to record long-term water quality data in order to observe and document any physical and chemical changes or trends in water quality over time. The objective of the chlorophyll and nutrient monitoring study is to ascertain the annual and tidal fluctuations in nutrient and chlorophyll a levels surrounding the four water quality sites.

Additional projects are ongoing and continually changing. Check with the Research Coordinator or other contact person for an updated list of research (see section I.1.).

II. Physical Structure Descriptors

9. Sensor specifications

Parameter: Precipitation

Units: millimeters (mm)

Sensor Type: Ecoharmony tipping bucket rain gauge

Model # TB4

Range: 0 to 600 mm/hr

Accuracy: 0.01 inches per bucket tip; +/- 3% for intensities from 25-600 mm/hr

Date of last calibration: 07/07/06

Parameter: Temperature

Units: Celsius

Sensor Type: Platinum resistance temperature detector (PRT)

Model #: HMP45C

Range: -40°C to 60°C

Accuracy: +/- 0.2°C @ 20°C

Date of last calibration: 04/19/06 (installed on 06/28/06)

Parameter: Relative Humidity

Units: Percent

Sensor Type: Vaisala HUMICAP© 180 capacitive relative humidity sensor

Model # HMP45C

Range: 0 to 100% non-condensing

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

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

Date of last calibration: 06/04/07 (installed on 06/28/07)

Parameter: LI-COR Quantum Sensor

Units: mmols m⁻² (total flux)

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

Model #: LI190SZ

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

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

Range: 1% up to 10,000 µmoles s⁻¹m⁻², 400-700 nm

Accuracy: 5 µA per 1000 µmoles s⁻¹m⁻², with a stability of <± 2% change per year

Date of last calibration: 05/13/06 (installed on 06/28/06)

Parameter: Wind Speed and Wind direction

Units: meters per second (m/s); degrees

Sensor type: Vaisala Ultrasonic Wind Sensor

Model #: 425

Range: 0 to 65 m/s (0 to 144 mph, 0 to 125 knots); 0 to 360°

Accuracy: ±0.135 m/s (±0.3 mph, ±0.26 knots) or 3% of reading, whichever is greater; ±2°

Date of last calibration: N/A (no calibration required) installed new on 07/15/02

Parameter: Barometric Pressure

Units: millibars (mb)

Sensor type: Vaisala Barometric Pressure

Model #: PTB101B

Range: 600 to 1060 mb

Accuracy: +/- 0.45 mb

Date of last calibration: 04/13/06 (installed on 06/28/06)

Storage Module

Model#: SM192

Storage capacity: 192,896 bytes

Operating range: Temperature: -35°C to +65°C

Processor: Hitachi 6303

Baud rates: 300, 1200, 9600, 76800

Memory type: user selectable for either ring style (default) or fill and drop.

Power requirements: 5 +/-0.4 VDC @ 100mA

Storage Module

Model#: SM4M

Storage capacity: 2 million low-resolution data values

Program storage: stores up to 8 programs with a total capacity of 128 KB

Processor: Hitachi H8S

Operating System: 64 KB, flash memory based, user downloadable

Operating range: Temperature: -35°C to +65°C

Baud rates: 9600, 76800

Memory type: user selectable for either ring style (default) or fill and drop.

Power requirements: 5 +/-0.3 VDC @ 100mA

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 CFM100 Compact Flash Module.

CR1000 Installed: 6/28/2006

10. Coded variable definitions

Sampling station:	Sampling site code:	Station code:
Research Creek	RC	nocrcmet

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 mmol/m² over a 15 minute interval. No negative PAR values were recorded for 2007 data.

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

Data were collected from January to May 2007 with the laptop. A Compact Flash Module was installed on 06-28-07 and used successfully through 08-15-07.

Due to a CF memory card reader malfunction, data collected for the time period: 08-15-07 10:00 to 09-27-07 13:15, were obtained from the CDMO export site instead of downloading via laptop or memory card. As a result some data are missing and flagged as 'see metadata'. Please contact the Research Coordinator for more information.

The weather station was powered down on 06-28-07 and 09-27-07, readings immediately following power up were rejected.

Temperature / humidity probe reinstalled and Weather Program Version 4 was installed 06-28-07. The rain gauge was calibrated on 6-28-2007 at 10:30, data recorded during calibration were corrected.

PAR data were corrected from 8-15-2007 at 9:45 through 9-11-2007 at 7:45. Telemetered PAR data had to be multiplied by 100 to get the correct value.

The wind sensor was realigned to magnetic North 09-27-07 13:30. A perceived change of 15 – 20 degrees was noted by technicians. Data prior to this realignment was retained.