

Apalachicola (APA) NERR Meteorological Metadata
January 2024 – December 2024
Latest Update: April 21, 2025

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 & Research Descriptors

1) Principal investigator & contact persons:

Megan Lamb, Research Coordinator
108 Island Drive
Eastpoint, FL 32328
850-670-7709
Megan.Lamb@FloridaDEP.gov

Ethan Bourque, Environmental Specialist II*
108 Island Drive
Eastpoint, FL 32328
850-670-7722
Ethan.Bourque@FloridaDEP.gov

*Main contact at Reserve.

2) Entry verification:

Data are uploaded from the CR1000/CR1000X data logger to a personal computer with a Windows 7 or newer operating system. 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 summary statistics, 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.

Ethan Bourque is responsible for all Meteorological data management.

3) Research objectives:

The objective of this research is to monitor meteorological data on a long-term basis. Data collected from the East Bay weather station complement those data taken from the East Bay water quality station. Data are also used in the analysis of other datalogger data collected at Cat Point, Dry Bar, Pilots Cove, and Little St. Marks. Weather station data will also be integrated with monitoring the Reserve is performing as a Sentinel Site for climate change. Positioning the weather station in East Bay allows the Reserve to monitor changes in rainfall, photosynthetically active radiation, temperature, and other weather parameters influencing the water quality of East Bay as well as climate change sentinel sites located in East Bay marshes. East Bay drains the Tate's Hell Swamp area, which was altered in the late 1960's and early

1970's by timber companies. An EPA grant allowed the Northwest Florida Water Management District to begin restoration of the site in 1995 to reduce non-point source runoff. East Bay is also an important nursery area for numerous fish and invertebrate species within Apalachicola Bay.

4) Research methods:

Campbell Scientific data telemetry equipment was installed at the East Bay weather station on 06/22/2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B01C09E. The transmissions are scheduled hourly at 0:00:50 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 collected in Eastern Standard Time (EST) for the entire year.

Data Collection (CR1000X):

The 15-minute data are collected in the following formats for the **CR1000/CR1000X**:

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) (Cumulative precipitation is no longer available via export from the CDMO. Please contact the reserve or the CDMO for more information or to obtain these data.)

Sensor Calibration QA/QC:

Sensors are calibrated either yearly or every 2 years according to the maintenance schedule dictated by the NERR System Wide Monitoring Program SOPs. The sensors and their wires are inspected monthly to make sure that they are clean, moving freely, and undamaged. The arm of the wind sensor is checked monthly to assure that it is aligned to true north.

Recommended calibration frequency for the MET station sensors:

- Temperature/Humidity- yearly recalibration
- Precipitation Gauge- yearly recalibration
- Wind Speed/Direction- every 2 years recalibration for the RM Young 5103 sensor
- Barometric Pressure- every 2 years recalibration
- PAR- every 2 years recalibration
- CR1000X- every 5 years

Data Storage/Interface with LoggerNet:

A Laptop is used to interface between the CR1000X and the LoggerNet software supplied by Campbell Scientific. Data is downloaded monthly and at the time of the download, a handheld Kestrel 4000 is used to measure weather conditions and compare them to the measurements of the sensors on the weather station. A neighboring weather station operated by Florida Department of Environmental Protection, Division of State Lands, is used for further comparison when necessary.

5) Site location and character:

The Apalachicola National Estuarine Research Reserve is located in the northwestern part of Florida, generally called the panhandle. It is located adjacent to the City of Apalachicola, and encompasses most of the Apalachicola Bay system, including 52 miles of the lower Apalachicola River. Passes, both natural and manmade, connect Apalachicola Bay to the northeastern Gulf of Mexico. The sampling site is located in the upper reaches of East Bay. East Bay is separated from Apalachicola Bay by two bridges and a causeway and is located to the north of Apalachicola Bay proper. The bay is 8.2 km long, has an average depth of approximately 1.0 m MHW, and an average width of 1.8 km. The tides in East Bay are mixed and range from 0.3 m to 1.0 m (average 0.5 m).

The weather station was located at latitude 29 47' 27.24 N and longitude 84 53' 0.24 W but was moved to latitude 29°46'9.78" N and longitude 84°52'53.35" W following serious damage from Hurricane Michael in 2018. This new site is roughly 2 nautical miles south southeast of the original location and roughly 1.8 nautical miles south southwest of the East Bay water quality station. The site is located in upper East Bay at the end of the dock at the Carrol Street office. The area is dominated by marsh vegetation (mainly *Juncus roemerianus*). The dominant upland habitat is primarily pineland forest, which includes slash pine, saw palmetto, and sand pine. In accordance with NERR SWMP and CDMO requirements the weather station wind and PAR sensors are mounted at the top of a 3-meter tower. The temperature/relative humidity sensor and barometric pressure sensor (inside the CR1000 enclosure) are mounted on the tower at 1.5 meters. The tower is mounted on an approximately 3 meter tall dock. The tipping bucket rain gauge is mounted on a 1.2 meter platform approximately 3.5 meters from the weather station tower. There is nothing nearby to shade the tower and the nearest wind block is the edge of the small pine forest about 0.1 kilometer southeast of the station.

Tower and sensor heights	Height (meters)	Notes
Tower	2.8	Dock to point of tower
Platform (if applicable)	2.06	Water to Dock
Enclosure	1.37	Dock to Enclosure
Temperature/Relative Humidity	1.73	
Barometric Pressure	0.192	
Wind	2.965	Bottom of box
PAR	1.72	
Precipitation gauge	1.22	3.56

SWMP Station Timeline:

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
APAEBMET	P	East Bay	29°47'27.24"N 84°53'0.24"W	01/01/2001 – 12/31/2018	Station damaged by hurricane Michael	Structure began to sink
APAEBMET	P	East Bay	29°46'9.78"N 84°52'53.35"W	09/03/2019 - current	NA	NA

6) Data collection period:

The Apalachicola weather monitoring station was erected on August 27, 1999 and began monitoring on September 3, 1999. The data submitted with this report encompasses data collected from January 1, 2024 00:00 through Dec 31, 2024 23:45.

Raw File Name	Start Date/Time	End Date/Time
Apacbm120823	12/08/2023 09:30	01/05/2024 10:00
Apacbm010524	01/05/2024 10:15	02/01/2024 11:00
Apacbm020124	02/01/2024 11:15	03/11/2024 13:15
Apacbm031124	03/11/2024 13:30	04/01/2024 09:45
Apacbm040124	04/01/2024 10:00	05/02/2024 10:00
Apacbm050224	05/02/2024 10:15	06/06/2024 09:45
Apacbm060624	06/06/2024 10:00	07/03/2024 07:00
Apacbm070324	07/03/2024 07:15	07/29/2024 12:45
Apacbm072924	07/29/2024 13:00	09/05/2024 10:15
Apacbm090524	09/05/2024 10:30	10/09/2024 09:00
Apacbm100924	10/09/2024 09:15	11/08/2024 10:00
Apacbm110824	11/08/2024 10:15	12/06/2024 11:00
Apacbm120624	12/06/2024 11:15	01/03/2025 13:15

7) Distribution:

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. 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.

Requested citation format:

NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://www.nerrsdata.org/>; accessed 12 October 2024.

NERR meteorological 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 www.nerrsdata.org. Data are available in comma delimited format.

8) Associated researchers and projects:

As part of the SWMP long-term monitoring program, APA NERR also collects 15-minute water quality data and monthly grab and diel samples for nutrient/pigment data which may be correlated with this meteorological dataset. These data are available at www.nerrsdata.org.

Apalachicola NERR Staff. NERRS Wetlands and Water Levels Program for Understanding Climate Change Impacts on Estuaries. 2012 – Ongoing.

Apalachicola NERR Staff. NERRs Emergent vegetation monitoring program. 2014 – Ongoing.

Apalachicola NERR Staff. Mangrove mapping and monitoring in the greater Apalachicola Bay area. 2014 – Ongoing.

Apalachicola NERR Staff. Apalachicola National Estuarine Research Reserve. Distribution and density of fishes and benthic invertebrates in Apalachicola Bay. 2000 – Ongoing.

Anderson, C. Auburn University, School of Forestry and Wildlife Sciences. Response of coastal riverine wetlands to water allocations in an urbanizing watershed.

Chen, S., Huang, W., Chen, W., Chen, X., 2011. An enhanced MODIS remote sensing model for detecting rainfall effects on sediment plume in the coastal waters of Apalachicola Bay. *Marine Environmental Research* 72, 265-272.

Edmiston, L.H., Fahrny, S.A., Lamb, M.S., Levi, L.K., Wanat, J.M., Avant, J.S., Wren, K., Selly, N.C., 2008. Tropical Storm and Hurricane Impacts on a Gulf Coast Estuary: Apalachicola Bay, Florida. *Journal of Coastal Research* SI, 38-49.

Gihring, T. Florida State University Ph.D. student, NOAA NERRs Graduate Fellowship 2005-2008 Award NA05NOS4201031. The role of oligohaline marshes as a source or sink of nitrogen to the Apalachicola Bay, Florida.

Hagen, S., DeLorme, D., Walters, L., Wang, D., Weishampel, J., Yeh, G., Huang, W., Slinn, D., Morris, J. NOAA Project Award 2010 – 2017. Integrated Modeling for the Assessment of Ecological Impacts of Sea Level Rise.

Joshi, I.D., D'Sa, E.J., Osburn, C.L., Bianchi, T.S., Ko, D.S., Oviedo-Vargas, D., Arellano, A.R., Ward, N.D., 2017. Assessing chromophoric dissolved organic matter (CDOM) distribution, stocks, and fluxes in Apalachicola Bay using combined field, VIIRS ocean color, and model observations. *Remote Sensing of Environment* 191, 359-372.

Joshi, I.D., D'Sa, E.J., Osburn, C.L., Bianchi, T.S., 2017. Turbidity in Apalachicola Bay, Florida from Landsat 5 TM and Field Data: Seasonal Patterns and Response to Extreme Events. *Remote Sensing* 9, 367.

Peterson, R. Florida State University Ph.D. student, NOAA NERRs Graduate Fellowship 2005-2008 Award NA05NOS4201041. Origin and fate of suspended particulates in the Apalachicola River: Impact on Apalachicola Bay.

Putland, J. Florida State University Department of Oceanography. NOAA NERRs Graduate Research Fellowship 2002-2005. Planktonic food web variations related to salinity and nutrient patterns in Apalachicola Bay.

Smith, S. Post-Doctoral Research Project. NOAA Environmental Cooperative Science Center / Florida A&M University Environmental Sciences Institute. 2007-2009. Drought, Reduced River Flow and Sea Level Rise: Exploring Climate Impacts on Carbon and Nitrogen Cycling in the Apalachicola Bay System.

Snyder, C.M., Feher, L.C., Osland, M.J., Miller, C.J., Hughes, A.R., Cummins, K.L., 2022. The Distribution and Structure of Mangroves (*Avicennia germinans* and *Rhizophora mangle*) Near a Rapidly Changing Range Limit in the Northeastern Gulf of Mexico. *Estuaries and Coasts* 45, 181-195.

Wang, H., Huang, W., Harwell, M., Edmiston, H.L., Johnson, E., Hsieh, P., Milla, K., Christensen, J., Stewart, J., Liu, X. 2008. Modeling oyster growth rate by coupling oyster population and hydrodynamic models for Apalachicola Bay, Florida, USA. *Ecological Modeling* 211:77-89.

Viveros, P. University of Florida Ph.D. student, NOAA NERRs Graduate Research Fellowship, 2008 - 2011. Phytoplankton composition and abundance in relation to salinity, nutrient and light gradients in the Apalachicola National Estuarine Research Reserve.

II. Physical Structure Descriptors

9) Sensor Specifications:

Parameter: Temperature
Units: Celsius
Sensor type: Pt1000 Class A
Model #: EE181 Temperature and Relative Humidity Probe
Operating Temperature: -40°C to +60°C
Range: -40°C to +60°C
Accuracy: ± 0.2 °C @ 23°C

S/N: 2015160012786B
Date of calibration: 04/16/2020
Dates of sensor use: 10/08/2020 – 10/07/2021

S/N: 184116000295FC
Date of calibration: 10/07/2021
Dates of sensor use: 10/07/2021 – 10/06/2022

S/N: 21451600195313
Date of calibration: 11/17/2021
Dates of sensor use: 10/06/2022 – 09/05/2024

S/N: 21411600154290
Date of calibration: 10/25/2021
Dates of sensor use: 09/05/2024 – current as of 04/11/2025

Parameter: Relative Humidity
Units: Percent
Sensor type: HC101
Model #: EE181 Temperature and Relative Humidity Probe
Range: 0-100% non-condensing
Accuracy: -15 to 40 °C: $\leq 90\%$ RH $\pm (1.3 + 0.003 \cdot \text{RH reading})$ % RH
-15 to 40 °C: $> 90\%$ RH $\pm 2.3\%$ RH
-25 to 60 °C: $\pm (1.4 + 0.01 \cdot \text{RH reading})$ % RH
-40 to 60 °C: $\pm (1.5 + 0.015 \cdot \text{RH reading})$ % RH

Temperature dependence of RH measurement: typically 0.03% RH/°C

Note: This sensor caps relative humidity values at 100%, measured values $> 100\%$ are altered to 100%

S/N: 2015160012786B
Date of calibration: 04/16/2020
Dates of sensor use: 10/08/2020 – 10/07/2021

S/N: 184116000295FC
Date of calibration: 05/26/2021
Dates of sensor use: 10/07/2021 – 10/06/2022

S/N: 21451600195313
Date of calibration: 11/17/2021
Dates of sensor use: 10/06/2022 – 09/05/2024

S/N: 21411600154290
Date of calibration: 10/25/2021
Dates of sensor use: 09/05/2024 – current as of 04/11/2025

Parameter: Barometric Pressure

Units: millibars (mb)

Sensor type: Vaisala Barocap © silicon capacitive pressure sensor

Model #: PTB110 (CS-106)

Operating Range: Pressure: 500 to 1100 mb; Temperature: -40°C to +60°C;

Humidity: non-condensing

Accuracy: ± 0.3 mb at +20°C, ± 0.6 mb at 0°C to 40°C, ± 1 mb at -20°C to +45°C, ± 1.5 mb at -40°C to +60°C

Stability: ± 0.1 mb per year

S/N: K0220004
Date of calibration: 08/26/2019
Dates of sensor use: 08/06/2021 – 08/15/2023

S/N: N4130442
Date of calibration: 04/14/2022
Dates of sensor use: 08/15/2023 – current as of 04/11/2025

Parameter: Wind speed

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

S/N: WM127200
Date of calibration: 03/03/2016
Dates of sensor use: 04/11/2016– 04/04/2017

S/N: 82852
Date of calibration: 08/08/2019
Dates of sensor use: 08/08/2019 – 08/06/2021

S/N: WM168479
Date of calibration: 04/02/2019
Dates of sensor use: 08/09/2021 – 08/15/2023

S/N: WM131274
Date of calibration: 05/02/2019
Dates of sensor use: 08/15/2023 – current as of 04/11/2025

Parameter: Wind direction

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

S/N: WM127200

Date of calibration: 03/03/2016

Dates of sensor use: 04/11/2016– 04/04/2017

S/N: 82852

Date of calibration: 08/02/2019

Dates of sensor use: 08/09/2019 – 08/06/2021

S/N: WM168479

Date of calibration: 04/16/2019

Dates of sensor use: 08/06/2021 – 08/15/2023

S/N: WM131274

Date of calibration: 05/02/2019

Dates of sensor use: 08/15/2023 – current as of 04/11/2025

****Note**** The arm of the wind sensor is checked monthly to ensure that it remains aligned to true north.

Parameter: Photosynthetically Active Radiation (PAR)

Units: millimoles m⁻² (total flux)

Sensor type: Quantum Sensor, high stability silicon photodiode (blue enhanced) in anodized aluminum case with acrylic diffuser

Model #: SQ-110 Apogee

Light spectrum waveband: 410 to 655 nm

Temperature dependence: 0.06 ± 0.06% per °C

Stability: <±2% change over 1 yr

Operating Temperature: -40°C to 70°C; Humidity: 0 to 100%

Cosine Response: 45° zenith angle: +/- 2%; 75° zenith angle: +/- 5%

Sensitivity: 0.2 mV per μmole m⁻² s⁻¹

Multiplier: 0.025

Field of view: 180°

S/N: 31574

Date of calibration: 9/04/2020

Dates of sensor use: 12/08/2020 – 12/01/2022

S/N: 22808

Date of calibration: 05/25/2021

Dates of sensor use: 12/01/2022 – 06/05/2023

Parameter: Photosynthetically Active Radiation (PAR)

Units: mmoles m⁻² (total flux)

Sensor type: Quantum Sensor; high stability silicon photodiode (blue enhanced) in anodized aluminum case with acrylic diffuser

Model: CS310 (SQ-500)
Light spectrum waveband: 389 to 692 nm
Temperature dependence: $-0.11 \pm 0.04\%/^{\circ}\text{C}$
Stability: $< \pm 2\%$ change over a 1-year period
Operating temperature: -40 to 70°C
Cosine Response: $\pm 5\%$ at 75° zenith angle
Sensitivity: 0.01 mV per $\mu\text{mol}/\text{m}^2/\text{s}$
Multiplier: 0.5

S/N: 4416
Date of calibration: 04/19/2023
Dates of sensor use: 06/05/2023 - current as of 04/11/2025

Parameter: Precipitation
Units: millimeters
Sensor type: Tipping Bucket Rain Gauge
Model #: TR525 USW
Funnel diameter: 8.0 inches
Rainfall per tip: 0.01 inch
Operating range: Temperature: 0° to 50°C ; Humidity: 0 to 100%
Accuracy: $\pm 1.0\%$ up to 1 in./hr; $\pm 0, -3\%$ from 1 to 2 in./hr; $\pm 0, -5\%$ from 2 to 3 in./hr

S/N: 59238-314
Date of calibration: 03/08/2017
Dates of sensor use: 05/14/2014 – 05/04/2018

S/N: 78181-1118
Date of calibration: 09/07/2021, previously calibrated 08/08/2019
Dates of sensor use: 09/07/2021 – 09/12/2022

S/N: 87695-0821
Date of calibration: 09/14/2023, previously calibrated 10/07/2021
Dates of sensor use: 09/12/2022 – 09/05/2024

S/N: 79002-119
Date of calibration: 09/26/2023
Dates of sensor use: 09/05/2024 – current as of 04/11/2025

CR1000X:

The CR1000X has a total onboard memory of 128 MB of flash and 4MB of battery backed SRAM. There are 8 MB of flash memory reserved for loading the operating system and 1MB of flash reserved for configuration settings. SRAM is used for the CRBasic program operating memory, communication memory, and data storage, with 72 MB of flash for extended data storage. Additional data storage expansion is available with a removable microSD flash memory card of up to 16 GB.

S/N: 3360
Calibrated: 05/11/2018, calibrated/serviced 12/04/2018 after Hurricane Michael
Installed: 06/22/2018 – 10/22/2018; 08/09/2019 – 07/29/2024
Removed: 07/29/2024

S/N: 12958
Calibrated: 10/10/2019

Installed: 07/29/2024– current as of 04/11/2025

Removed: In use as of 04/11/2025

CR1000/CR1000X Firmware Version (s):

CR1000 Firmware Version 24 in use from 08:45 10/12/2012 – 14:15 02/14/2014
CR1000 Firmware Version 27 in use from 14:30 02/14/2014 – 07:30 05/04/2018
CR1000 Firmware Version 32.02 in use from 08:00 05/04/2018 - 08:00 06/22/2018
CR1000X Firmware Version 1.02 in use from 08:00 06/22/2018 –15:45 10/22/2018
CR1000X Firmware Version 2.00 in use from 10:45 08/09/2019 – 13:15 10/25/2021
CR1000X Firmware Version 5.01 in use from 14:00 10/25/2021 – 09:45 03/20/2023
CR1000X Firmware Version 6.01 in use from 10:00 03/20/2023 – 12:45 07/29/2024
CR1000X Firmware Version 7.02 in use from 13:00 07/29/24– current as of 04/11/2025

CR1000/CR1000X Program Version(s):

apaebmet_6.0.1_080919 in use 09:45 10/20/2019 – 10:45 02/03/2022
apaebmet_6.0.3_012622 in use 12:45 02/03/2022 – 15:00 02/04/2022
apaebmet_6.0.3_020422 in use 15:15 02/04/2022 – 09:45 03/20/2023
apaebmet_6.0.4_031423 in use 10:00 03/20/2023 – 07:30 05/03/2023
apaebmet_6.0.5_033023 in use 07:45 05/03/2023– 09:30 06/05/2023
apaebmet_6.0.6_033023 in use 10:00 06/05/2023 – 12:45 06/07/2023
apaebmet_6.0.7_033023 in use 13:00 06/07/2023 – 12:45 07/29/2024
apaebmet_6.0.8_071124 in use 13:00 07/29/2024 – current as of 04/11/2025

GOES Transmitter:

Model Number: TX325-R

Serial Number: 300002085

Date Installed: 02/03/2022

10) Coded variable indicator and variable code definitions:

Sampling station: Sampling site code: Station code:

East Bay EB apaebmet

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 CR1000/CR1000X, 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
CCU	Cause unknown
CDF	Data appear to fit conditions
CML	Snow melt from previous snowfall event
CRE*	Significant rain event
CSM*	See metadata
CVI*	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.

Relative Humidity data greater than 100 are within range of the sensor accuracy of +/-3% and are flagged and coded as suspect, <1> (CAF). Values greater than 103 are rejected <-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. **Note: Cumulative precipitation is no longer available via export from the CDMO. Please contact the Reserve or the CDMO for more information or to obtain these data.**

Nighttime PAR values less than or greater than 0.0 mmoles m⁻² are flagged and coded as <1> (CSM), indicating that users should be aware of possible data inconsistencies. Nighttime periods were determined using sunrise-sunset times obtained from <http://www.sunrisesunset.com>.

>=50mm Cumulative Precipitation & >=16mm Total Precipitation is considered to be a Significant Rain Event at this Location. Significant rain events are coded as [GSM](CRE).

01/05/2024 21:30 - 01/06/2024 04:30 Significant weather event; Total Precipitation and Wind Speed coded for duration of event; Cumulative Precipitation coded through end of day.

01/06/2024 03:00 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

03/05/2024 03:30 – 05:45, 07:00 – 20:15 Significant rain event; Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

04/03/2024 05:45 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

04/11/2024 01:00, 02:00 – 04:00, 07:00 Significant rain event, Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

04/1/2024 02:45 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

05/13/2024 13:15 – 14:15, 14:45 – 17:00, 17:30 Significant rain event; Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

06/06/2024 10:15 Missing data record, cause unknown

07/29/2024 13:00 Reject all, swapped CR1000X.

08/15/2024 22:00 Significant rain event, Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

08/04/2024 00:00 – 08/05/2024 23:30 Hurricane Debby Landfall 08/04/2024 Big Bend Florida.

09/09/2024 00:00 – 09/12/2024 23:45 Hurricane Francien Landfall 09/11/2024 in Louisiana.

09/07/2024 09:15 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

09/07/2024 08:45 – 11:00, 14:45 – 15:00, 15:30, 17:45 – 18:30, 19:45, 20:15, 20:45 – 21:00 Significant rain event; Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

09/12/2024 07:30, 11:30 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

09/12/2024 01:30, 02:15 – 04:00, 04:30 – 07:45, 10:15 - 10:45, 11:15 – 12:15 Significant rain event Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

09/13/2024 05:45 Significant 15-minute rain event for Total Precipitation; Cumulative Precipitation coded through end of day.

09/13/2024 01:00, 05:00, 05:30 – 09:00, 12:15, 17:15 – 19:15, 23:00 – 23:45 Significant rain event Total Precipitation coded for duration of event; Cumulative Precipitation coded through end of day.

09/26/2024 01:00 – 02:15, 03:00 – 04:30, 05:00 – 22:00, 23:00 – 23:30 Significant rain event Total Precipitation coded for duration of event; Cumulative Precipitation, Barometric Pressure, and Wind Speed coded through end of day.

09/26/2024 00:15 – 09/27/2024 20:00 Hurricane Helene Landfall 9/26 Aucilla River FL