

Jobos Bay (JOB) National Estuarine Research Reserve Meteorological Metadata

January - December 2003

Latest Update: **October 11, 2023**

I. Data Set & Research Descriptors

1) Principal investigator(s) & contact persons

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2) Entry verification

Collected data are verified (QA/QC), using the CDMO Weather Data Management Program.

a) Data Input Procedures:

The 15-minute, 1-hour average, and 24-hour meteorological data was downloaded from each weather station instrument to Campbell Scientific CR10X data logger. The CDMO Data Logger Program (nerr30.csi) was loaded into the CR10X data logger that controls the sensors and data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The CR10X was then interfaced with the PC208W software supplied by Campbell Scientific.

Data was downloaded through a storage module, at the beginning of every month, via a direct connection to a computer located in Jobos Bay Laboratory. The data was saved as a monthly raw data file (RAWjan03.dat) in a separate hard drive and backed up onto Zip disk and CD.

Once an entire month of data was available, the CDMO Weather Data Management Program (WDMP) was used to convert the files to an Access database. This program was developed in Visual Basic to interface with the NERR Meteorological Data Collection Schedule (see 2b of the Entry Verification section for the data collection schedule). The WDMP automatically imports and converts the monthly raw data file into an Access database. There are three main steps the WDMP performs: First, it converts the comma delimited monthly raw data file into an Access database. Secondly, it checks the data against a predetermined set of error criteria (see Appendix G for the CDMO Meteorological Data Collection Error/Anomalous Data Criteria). Finally, it produces error and summary reports. Any anomalous data was investigated and noted

below in the Anomalous Data Section. All data corrections performed are noted in the Data Correction Section below.

Common errors noted in the monthly error report include wind speeds below the 0.5 m/s criteria, temperature change greater than 3 C in a 15minute period, and precipitation difference greater than 5mm in 15 minutes. All errors of this type were double checked with other data that could support such “anomalous” weather changes and noted in the sections that follow. Both raw data files and Access databases were saved on Compact Disc.

EQwin now replaces the WDMP as the NERR MET primary QA/QC program.

The Centralized Data Management Office converted all SWMP weather data collected with CR10X program versions prior to version 4.0 which was distributed in October 2003. This was necessary in order to merge the old data format (12 array output) with the new data format found in version 4.0 (3 array output). The new format produces averages, maximums and minimums every fifteen minutes (array 15), every hour (array 60) and every day (array 144) for any sensors hooked up to the CR10X. Specifically, the 150 and 151 fifteen minute data were converted to the new 15 array; the hourly 101, 102, 105 and 106 data were converted to the new 60 array; and the daily 241, 242, 243, 244, 245 and 246 data were converted to the new 144 array. With the new format, the use of 55555's to code for deleted data and 11111's to code for missing data have been abandoned. Hence, all 55555's or 11111's contained in the SWMP weather data collected prior to Version 4.0 of the CR10X program were removed and left blank.

b) Data Collection Schedule

Data are collected in the following formats:

- (1) Sample data points are collected every 15 minutes.
- (2) Hourly averages are produced every 60 minutes.
- (3) Daily average, maximum with time, and minimum with time every 24 hours.
 - i) 15-minute data are collected instantaneously for Air Temperature (C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). 15-minute Precipitation (mm) and PAR (mmol/m²) data are totaled from 5-second readings, prior to NERR_4.CSI
 - ii) 15-minute average, maximum and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb) and Wind Speed (m/s) with NERR_4.CSI.
 - iii) Hourly average, maximum, and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.
 - iv) Daily average, maximum and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

Data were stored on a Campbell Scientific storage module (SM192 or SM4M), which

were retrieved monthly. The data were downloaded and pre-processed as described in Section 2. QA/QC of the data was conducted using either the WDMP or EQWin.

WDMP error reports and EQWin queries were based on the following anomalous data criteria:

Air Temp:

- 15 min sample not greater than max for the day
- 15 min sample not less than the min for the day
- 15 min sample not greater than 3.0 C from the previous 15 minutes (WDMP only)
- Max and min temp recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 50 C or less than -30 C (EQWin only)

Relative Humidity:

- Not changed by more than 25% from the previous 15 minutes (WDMP only)
- Max and min humidity recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 100% or less than 0% (EQWin only)

Pressure:

- Pressure not greater than 1040 mb or less than 980 mb (WDMP only)
- Pressure changes greater than 5 mb per hour (WDMP only)
- Maximum and minimum values recorded for the day (WDMP only)
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour (WDMP only)
- Sample not greater than 1060 mb or less than 900 mb (EQWin only)

Wind Speed:

- Wind speed not greater than 65 m/s or less than 0.5 m/s (WDMP only)
- Wind speed not greater than 30 m/s (EQWin only)
- Wind speed not less than 0.5 m/s for 12 consecutive hours (EQWin only)

Wind Direction:

- Wind direction not greater than 360 degrees or less than 0 degrees

Rainfall:

- Precipitation not greater than 5 mm in 15 min
- No precipitation for the month (WDMP only)

Photosynthetically Active Radiation (PAR):

- Sample not greater than 5000 mmol/m² or less than -0.5 mmol/m²

Time:

- 15-minute interval recorded

For all data:

- No duplicate data

3) Research objectives (Campbell Weather Station):

The principal objective is to record long-term meteorological data to track changes in meteorological conditions that can be associated to changes in estuarine habitats and conditions. A secondary objective is to promote the access and use of reliable baseline information by federal and local agencies, universities, researchers, educators and local communities to enhance the process by which they make decisions regarding their daily activities. This data are also invaluable in the identification and development of future monitoring and research activities.

4) Research methods:

The Campbell Scientific weather station samples every 5 seconds to produce both hourly and daily averages of those measurements of air temperature, relative humidity, barometric pressure, rainfall, wind speed and wind direction. An instantaneous sample is taken every 15 minutes and that data are stored in array 150. The data are downloaded from the storage module to the laboratory computer by direct connection. Sensors on the weather station are inspected periodically for damage or debris. If any are found, sensors are repaired and/or cleaned. The rain gauge tends to collect the most debris and needs to be cleaned every few days. Sensors are removed and sent to Campbell Scientific for calibration at a minimum of every two years. There were no other analyses done on the meteorological data.

5) Site location and character:

The Jobos Bay National Estuarine Research Reserve (JBNERR) is located on the southern coastal plain of the island of Puerto Rico, the reserve is within the West Indies geographical area. JBNERR is formed by two major components: (1) Mar Negro, located on the western margin of the Bay, and (2) Cayos Caribe, a chain of 15 tear-shaped islets located to the southeast. The Mar Negro component comprises the bulk of the Reserve, and consists of mangrove forests and a complex system of lagoons and channels interspersed with salt and mud flats. Coral reefs and sea grass beds, with small beach deposits and upland areas fringe Cayos Caribe mangrove islands.

The weather station is situated in front of the Visitor's Center, located in the community of Aguirre, Salinas, Puerto Rico. The Wind Sentry, Temperature and Humidity sensor, Barometric Sensor and LiCor Sensor are all located on a 10m aluminum tower following the descriptions outlined in the CDMO Manual V 4.0. The Tipping Bucket Rain gauge is located to the SW side of the tower. The sensors were wired to the CR10X following the protocol in the CDMO Manual.

A description of the specific sampling station follows:

The weather station is located in front of JBNERR Visitor's Center. Its coordinates are latitude 17° 57' 23.34"; longitude 66° 13' 22.56".

6) Data collection period:

The current weather station was deployed in 1999. Data have been collected for years 2000, 2001, 2002 and 2003. All data collected since year 2000 has been edited using the CDMO Weather Program.

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 are 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 in text format and Access data tables.

8) Associated researchers and projects:

Jobos Bay NERR system-wide monitoring program has four YSI's continuous sampling stations (s9, s10, s19, s20) that collect long term water quality data, every 30 minutes, to track changes in water quality in the Bay. Parameters include temperature, dissolve oxygen (% saturation, mg/L), specific conductivity, salinity, depth, pH and turbidity. Stations 9 and 10 were selected to represent sites that could compare human impact gradients, being Station 9 an impacted site and station 10 the reference site. Stations 19 and 20 were just recently established (July 2002) to compare an ecosystem gradient. Station 19 was deployed over sea grass beds, *Thalassia testudinum*, in the bay and station 20 was deployed over sea grass bed communities near Cayos Caribe coral reefs.

II. Physical Structure Descriptors

9) Sensor specifications, operating range, accuracy, date of last calibration:

LiCor Quantum Sensor
Model # LI190SB
Stability: $<\pm 2\%$ change over 1 yr
Operating Temperature: -40 to 65°C
Sensitivity: typically 5 μA per 1000 $\mu\text{moles s}^{-1} \text{m}^{-2}$
Light spectrum wavelength: 400 to 700 nm
Date of last calibration: 07-22-99

Wind Sentry
Model # 03001

Range: 0-50 m/s; 360° mechanical
Date of last calibration: 08-16-99

Temperature and Relative Humidity

Model #: HMP35C
Operating Temperature: -35 to +50°C
Temperature Measurement Range: -35 to +50°C
Temperature Accuracy: ± 0.2 °C @ 20°C
Relative Humidity Measurement Range: 0-100% non-condensing
RH Accuracy: $\pm 2\%$ RH (0-90%) and $\pm 3\%$ (90-100%)
Uncertainty of calibration: $\pm 1.2\%$ RH
Date of Last calibration: 07-24-99

Barometric Sensor

Model # CS-105
Operating Range: Pressure – 600 to 1060 mb
Temperature: -40 to +60C
Humidity: non-condensing
Accuracy: ± 0.5 to 6.0 mb (+20-60C)

Stability: ± 0.1 mb per year
Date of Last calibration: 05-16-99

Tipping Bucket Rain Gauge

Model #: RG-2000-C
Range: 0.254 mm
Accuracy: 1.0% at <14 "/hr
Date of Last calibration: 8-14-01

Campbell Scientific CR10X Wiring Panel. Has 128K of flash memory (EEPROM), in which it stores the operating system and it's program (that it uses to run the weather station). Additionally, there are 128K of SRAM, which it uses to run the program and store its measurements and for final data storage.

10) Coded variable indicator and variable code definitions:

Sampling station:	Sampling site code:	Station code:
Jobos Bay	JB	jobjbmet

11) Data anomalies/Data corrections:

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

January 2003

The following data appear to be correct:

Array	Date	Day	Time	Error Message
151	6	6	915	Precip difference from 6 (6) 915 (5.334) to 6 (6) 930 (.254) is greater than 5 mm
151	24	24	1630	Precip difference from 24 (24) 1630 (.254) to 24 (24) 1645 (7.112) is greater than 5 mm
151	24	24	1645	Precip difference from 24 (24) 1645 (7.112) to 24 (24) 1700 (.762) is greater than 5 mm
102	4	4	2000	Wind speed is less than 0.5 m/s from 4 (4) 2000 to 5 (5) 900
102	6	6	1800	Wind speed is less than 0.5 m/s from 6 (6) 1800 to 7 (7) 900
102	7	7	1900	Wind speed is less than 0.5 m/s from 7 (7) 1900 to 8 (8) 1000
102	8	8	1800	Wind speed is less than 0.5 m/s from 8 (8) 1800 to 9 (9) 900
102	15	15	1900	Wind speed is less than 0.5 m/s from 15 (15) 1900 to 16 (16) 800
102	22	22	2000	Wind speed is less than 0.5 m/s from 22 (22) 2000 to 23 (23) 900
102	23	23	1900	Wind speed is less than 0.5 m/s from 23 (23) 1900 to 24 (24) 900
102	27	27	2000	Wind speed is less than 0.5 m/s from 27 (27) 2000 to 28 (28) 900

February 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a short period of rain:

Array	Date	Day	Time	Error Message
150	58	27	1430	Technician deleted relative humidity from 27 1430 to 1615
101	58	27	1400	Technician deleted relative humidity from 27 1400 to 1700
243	58	27	2400	Technician deleted relative humidity at 27 2400
244	58	27	2400	Technician deleted relative humidity at 27 2400
150	59	28	445	Technician deleted relative humidity from 28 445 to 1630
101	59	28	400	Technician deleted relative humidity from 28 400 to 1700
150	59	28	1830	Technician deleted relative humidity from 28 1830 to 1915
101	59	28	1900	Technician deleted relative humidity from 28 1900 to 2000
243	59	28	2400	Technician deleted relative humidity at 28 2400
244	59	28	2400	Technician deleted relative humidity at 28 2400
243	60	29	2400	Technician deleted relative humidity at 29 2400
244	60	29	2400	Technician deleted relative humidity at 29 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use all RH data with discretion.

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	27	58	1115	Rel hum difference from 27 (58) 1115 (100) to 27 (58) 1130 (74.979) is greater than 25%
102	1	32	1900	Wind speed is less than 0.5 m/s from 1 (32) 1900 to 2 (33) 900
102	2	33	1800	Wind speed is less than 0.5 m/s from 2 (33) 1800 to 3 (34) 900
102	26	57	2000	Wind speed is less than 0.5 m/s from 26 (57) 2000 to 27 (58) 800

March 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	15	74	1215	Air temp difference from 15 (74) 1215 (28.494) to 15 (74) 1230 (24.904) is greater than 3.0 degrees C
102	19	78	1900	Wind speed is less than 0.5 m/s from 19 (78) 1900 to 20 (79) 900
102	20	79	1800	Wind speed is less than 0.5 m/s from 20 (79) 1800 to 21 (80) 900
102	21	80	2000	Wind speed is less than 0.5 m/s from 21 (80) 2000 to 22 (81) 900
102	22	81	1900	Wind speed is less than 0.5 m/s from 22 (81) 1900 to 23 (82) 800
102	26	85	2000	Wind speed is less than 0.5 m/s from 26 (85) 2000 to 27 (86) 800

April 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a short period of rain:

Array	Date	Day	Time	Error Message
150	108	18	0645	Technician deleted relative humidity at 18 0645
101	108	18	0700	Technician deleted relative humidity at 18 0700
150	108	18	1530	Technician deleted relative humidity at 18 1530
101	108	18	1600	Technician deleted relative humidity at 18 1600
243	108	18	2400	Technician deleted relative humidity at 18 2400
244	108	18	2400	Technician deleted relative humidity at 18 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times.

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	9	99	945	Air temp difference from 9 (99) 945 (27.709) to 9 (99) 1000 (23.93) is greater than 3.0 degrees C
150	18	108	1215	Rel hum difference from 18 (108) 1215 (89.021) to 18 (108) 1230 (50.132) is greater than 25%
150	18	108	1230	Rel hum difference from 18 (108) 1230 (50.132) to 18 (108) 1245 (88.095) is greater than 25%
150	20	110	915	Rel hum difference from 20 (110) 915 (74.325) to 20 (110) 930 (47.407) is greater than 25%

151	17	107	1230	Precip difference from 17 (107) 1230 (9.906) to 17 (107) 1245 (2.794) is greater than 5 mm
102	1	91	1800	Wind speed is less than 0.5 m/s from 1 (91) 1800 to 2 (92) 900
102	19	109	2100	Wind speed is less than 0.5 m/s from 19 (109) 2100 to 20 (110) 900
102	21	111	2000	Wind speed is less than 0.5 m/s from 21 (111) 2000 to 22 (112) 800
102	23	113	2000	Wind speed is less than 0.5 m/s from 23 (113) 2000 to 24 (114) 800
102	24	114	1700	Wind speed is less than 0.5 m/s from 24 (114) 1700 to 25 (115) 900

May 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	8	128	1115	Air temp difference from 8 (128) 1115 (27.657) to 8 (128) 1130 (24.313) is greater than 3.0 degrees C
150	13	133	1300	Air temp difference from 13 (133) 1300 (29.787) to 13 (133) 1315 (26.584) is greater than 3.0 degrees C
150	14	134	945	Air temp difference from 14 (134) 945 (27.007) to 14 (134) 1000 (23.83) is greater than 3.0 degrees C
102	19	139	2000	Wind speed is less than 0.5 m/s from 19 (139) 2000 to 20 (140) 1000
102	20	140	2100	Wind speed is less than 0.5 m/s from 20 (140) 2100 to 21 (141) 900
102	21	141	1900	Wind speed is less than 0.5 m/s from 21 (141) 1900 to 22 (142) 900

June 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	2	153	930	Air temp difference from 2 (153) 930 (27.198) to 2 (153) 945 (24.082) is greater than 3.0 degrees C
150	7	158	1000	Air temp difference from 7 (158) 1000 (27.965) to 7 (158) 1015 (23.617) is greater than 3.0 degrees C
151	6	157	1000	Precip difference from 6 (157) 1000 (7.874) to 6 (157) 1015 (2.794) is greater than 5 mm

July 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	5	186	930	Air temp difference from 5 (186) 930 (27.523) to 5 (186) 945 (24.49) is greater than 3.0 degrees C

150 6 187 1715 Air temp difference from 6 (187) 1715 (31.035) to 6 (187) 1730 (27.933) is greater than 3.0 degrees C

August 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	18	230	1230	Air temp difference from 18 (230) 1230 (30.589) to 18 (230) 1245 (26.896) is greater than 3.0 degrees C
151	25	237	2330	Precip difference from 25 (237) 2330 (4.064) to 25 (237) 2345 (11.176) is greater than 5 mm
151	25	237	2400	Precip difference from 25 (237) 2400 (7.62) to 26 (238) 15 (1.524) is greater than 5 mm
151	26	238	15	Precip difference from 26 (238) 15 (1.524) to 26 (238) 30 (10.668) is greater than 5 mm
151	26	238	45	Precip difference from 26 (238) 45 (12.446) to 26 (238) 100 (3.81) is greater than 5 mm
102	4	216	2000	Wind speed is less than 0.5 m/s from 4 (216) 2000 to 5 (217) 800
102	11	223	2000	Wind speed is less than 0.5 m/s from 11 (223) 2000 to 12 (224) 800
102	14	226	2000	Wind speed is less than 0.5 m/s from 14 (226) 2000 to 15 (227) 800

September 2003

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	15	258	1100	Air temp difference from 15 (258) 1100 (30.746) to 15 (258) 1115 (26.469) is greater than 3.0 degrees C
151	5	248	1945	Precip difference from 5 (248) 1945 (.762) to 5 (248) 2000 (8.636) is greater than 5 mm
102	1	244	1900	Wind speed is less than 0.5 m/s from 1 (244) 1900 to 2 (245) 900
102	2	245	1800	Wind speed is less than 0.5 m/s from 2 (245) 1800 to 3 (246) 900
102	3	246	1800	Wind speed is less than 0.5 m/s from 3 (246) 1800 to 4 (247) 900
102	4	247	1900	Wind speed is less than 0.5 m/s from 4 (247) 1900 to 5 (248) 800
102	10	253	1900	Wind speed is less than 0.5 m/s from 10 (253) 1900 to 11 (254) 800
102	11	254	2100	Wind speed is less than 0.5 m/s from 11 (254) 2100 to 12 (255) 1000
102	12	255	1800	Wind speed is less than 0.5 m/s from 12 (255) 1800 to 13 (256) 900
102	13	256	1900	Wind speed is less than 0.5 m/s from 13 (256) 1900 to 14 (257) 800
102	16	259	2000	Wind speed is less than 0.5 m/s from 16 (259) 2000 to 17 (260) 800
102	17	260	1900	Wind speed is less than 0.5 m/s from 17 (260) 1900 to 18 (261) 700

102 900	21	264	2100	Wind speed is less than 0.5 m/s from 21 (264) 2100 to 22 (265)
102 800	22	265	1900	Wind speed is less than 0.5 m/s from 22 (265) 1900 to 23 (266)
102 800	23	266	1900	Wind speed is less than 0.5 m/s from 23 (266) 1900 to 24 (267)
102 800	24	267	2000	Wind speed is less than 0.5 m/s from 24 (267) 2000 to 25 (268)
102 700	25	268	1900	Wind speed is less than 0.5 m/s from 25 (268) 1900 to 26 (269)

October 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a period of rain:

Array	Date	Day	Time	Error Message
150	284	11	0400	Technician deleted relative humidity at 11 0400
101	284	11	0500	Technician deleted relative humidity at 11 0500
150	284	11	2015	Technician deleted relative humidity from 11 2015 to 2215
101	284	11	2100	Technician deleted relative humidity from 11 2100 to 2300
243	284	11	2400	Technician deleted relative humidity at 11 2400
244	284	11	2400	Technician deleted relative humidity at 11 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use the RH data with discretion.

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	9	282	1030	Air temp difference from 9 (282) 1030 (30.4) to 9 (282) 1045 (26.728) is greater than 3.0 degrees C
150	30	303	1345	Air temp difference from 30 (303) 1345 (30.652) to 30 (303) 1400 (27.529) is greater than 3.0 degrees C
150	11	284	530	Rel hum difference from 11 (284) 530 (97.84) to 11 (284) 545 (67.539) is greater than 25%
150	11	284	545	Rel hum difference from 11 (284) 545 (67.539) to 11 (284) 600 (92.542) is greater than 25%
150	11	284	815	Rel hum difference from 11 (284) 815 (59.392) to 11 (284) 830 (86.508) is greater than 25%
150	12	285	15	Rel hum difference from 12 (285) 15 (91.076) to 12 (285) 30 (54.963) is greater than 25%
150	12	285	30	Rel hum difference from 12 (285) 30 (54.963) to 12 (285) 45 (88.103) is greater than 25%
150	12	285	45	Rel hum difference from 12 (285) 45 (88.103) to 12 (285) 100 (45.837) is greater than 25%
150	12	285	100	Rel hum difference from 12 (285) 100 (45.837) to 12 (285) 115 (91.542) is greater than 25%
151	10	283	1000	Precip difference from 10 (283) 1000 (2.286) to 10 (283) 1015 (11.684) is greater than 5 mm

151	10	283	1030	Precip difference from 10 (283) 1030 (16.51) to 10 (283) 1045 (2.286) is greater than 5 mm
151	10	283	1245	Precip difference from 10 (283) 1245 (7.112) to 10 (283) 1300 (.508) is greater than 5 mm
102	1	274	1900	Wind speed is less than 0.5 m/s from 1 (274) 1900 to 2 (275) 800
102	2	275	1800	Wind speed is less than 0.5 m/s from 2 (275) 1800 to 3 (276) 900
102	3	276	1800	Wind speed is less than 0.5 m/s from 3 (276) 1800 to 4 (277) 900
102	4	277	1800	Wind speed is less than 0.5 m/s from 4 (277) 1800 to 5 (278) 800
102	5	278	2000	Wind speed is less than 0.5 m/s from 5 (278) 2000 to 6 (279) 800
102	7	280	2000	Wind speed is less than 0.5 m/s from 7 (280) 2000 to 8 (281) 800
102	8	281	1900	Wind speed is less than 0.5 m/s from 8 (281) 1900 to 9 (282) 700
102	13	286	2000	Wind speed is less than 0.5 m/s from 13 (286) 2000 to 14 (287) 1000
102	14	287	2000	Wind speed is less than 0.5 m/s from 14 (287) 2000 to 15 (288) 1000
102	15	288	1700	Wind speed is less than 0.5 m/s from 15 (288) 1700 to 16 (289) 800
102	16	289	2000	Wind speed is less than 0.5 m/s from 16 (289) 2000 to 17 (290) 800
102	17	290	2000	Wind speed is less than 0.5 m/s from 17 (290) 2000 to 18 (291) 800
102	18	291	1900	Wind speed is less than 0.5 m/s from 18 (291) 1900 to 19 (292) 800
102	22	295	1800	Wind speed is less than 0.5 m/s from 22 (295) 1800 to 23 (296) 2200
102	24	297	1900	Wind speed is less than 0.5 m/s from 24 (297) 1900 to 25 (298) 700
102	25	298	1900	Wind speed is less than 0.5 m/s from 25 (298) 1900 to 26 (299) 800
102	27	300	1700	Wind speed is less than 0.5 m/s from 27 (300) 1700 to 28 (301) 900
102	29	302	1800	Wind speed is less than 0.5 m/s from 29 (302) 1800 to 30 (303) 900
102	30	303	2100	Wind speed is less than 0.5 m/s from 30 (303) 2100 to 31 (304) 1000

November 2003

Values were deleted for relative humidity for the following arrays and replaced with 55555 because the sensor was not functioning, indicating humidity values near 0% during the night and under a period of rain:

Array	Date	Day	Time	Error Message
150	318	14	745	Technician deleted relative humidity from 14 745 to 800
101	318	14	800	Technician deleted relative humidity at 14 800
150	318	14	1000	Technician deleted relative humidity from 14 1000 to 1015
101	318	14	1000	Technician deleted relative humidity from 14 1000 to 1100
243	318	14	2400	Technician deleted relative humidity at 14 2400
244	318	14	2400	Technician deleted relative humidity at 14 2400
150	319	15	945	Technician deleted relative humidity from 15 945 to 30 2400
101	319	15	1000	Technician deleted relative humidity from 15 1000 to 30 2400

243	319	15	2400	Technician changed 243 Array data from 15 2400 to 30 2400
244	13	317	2400	Technician changed 244 Array data from 15 2400 to 30 2400

All Daily and Hourly Relative Humidity data may be suspect as the RH sensor was not functioning at times; it is recommended to use the RH data with discretion.

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	13	317	1645	Rel hum difference from 13 (317) 1645 (78.042) to 13 (317) 1700 (47.288) is greater than 25%
150	13	317	1700	Rel hum difference from 13 (317) 1700 (47.288) to 13 (317) 1715 (84.193) is greater than 25%
150	14	318	800	Rel hum difference from 14 (318) 800 (59.078) to 14 (318) 815 (88.843) is greater than 25%
150	14	318	1315	Rel hum difference from 14 (318) 1315 (80.803) to 14 (318) 1330 (51.574) is greater than 25%
150	14	318	1330	Rel hum difference from 14 (318) 1330 (51.574) to 14 (318) 1345 (87.409) is greater than 25%
151	6	310	1430	Precip difference from 6 (310) 1430 (6.35) to 6 (310) 1445 (.254) is greater than 5 mm
151	7	311	715	Precip difference from 7 (311) 715 (3.048) to 7 (311) 730 (10.414) is greater than 5 mm
151	7	311	800	Precip difference from 7 (311) 800 (6.604) to 7 (311) 815 (.254) is greater than 5 mm
151	9	313	145	Precip difference from 9 (313) 145 (.762) to 9 (313) 200 (6.858) is greater than 5 mm
151	9	313	200	Precip difference from 9 (313) 200 (6.858) to 9 (313) 215 (.254) is greater than 5 mm
151	10	314	1900	Precip difference from 10 (314) 1900 (2.286) to 10 (314) 1915 (7.62) is greater than 5 mm
151	10	314	1915	Precip difference from 10 (314) 1915 (7.62) to 10 (314) 1930 (1.778) is greater than 5 mm
151	11	315	1245	Precip difference from 11 (315) 1245 (.508) to 11 (315) 1300 (11.938) is greater than 5 mm
151	11	315	1315	Precip difference from 11 (315) 1315 (12.954) to 11 (315) 1330 (7.366) is greater than 5 mm
151	11	315	1430	Precip difference from 11 (315) 1430 (11.938) to 11 (315) 1445 (19.05) is greater than 5 mm
151	11	315	1500	Precip difference from 11 (315) 1500 (20.828) to 11 (315) 1515 (12.7) is greater than 5 mm
151	11	315	1515	Precip difference from 11 (315) 1515 (12.7) to 11 (315) 1530 (19.558) is greater than 5 mm
151	11	315	1530	Precip difference from 11 (315) 1530 (19.558) to 11 (315) 1545 (11.43) is greater than 5 mm
151	12	316	800	Precip difference from 12 (316) 800 (6.096) to 12 (316) 815 (11.176) is greater than 5 mm
151	12	316	2045	Precip difference from 12 (316) 2045 (.254) to 12 (316) 2100 (7.112) is greater than 5 mm

151	13	317	1900	Precip difference from 13 (317) 1900 (1.27) to 13 (317) 1915 (6.35) is greater than 5 mm
102	1	305	2100	Wind speed is less than 0.5 m/s from 1 (305) 2100 to 2 (306) 900
102	2	306	1900	Wind speed is less than 0.5 m/s from 2 (306) 1900 to 3 (307) 700
102	14	318	1600	Wind speed is less than 0.5 m/s from 14 (318) 1600 to 16 (320) 900
102	19	323	2200	Wind speed is less than 0.5 m/s from 19 (323) 2200 to 20 (324) 1000
102	24	328	2100	Wind speed is less than 0.5 m/s from 24 (328) 2100 to 25 (329) 900

December 2003

All values for December were deleted for Array 150, 101, 241, 243 and 244 for relative humidity and replaced with 55555 because the sensor was not functioning.

The following data appears to be correct:

Array	Date	Day	Time	Error Message
150	7	341	2030	Air temp difference from 7 (341) 2030 (26.753) to 7 (341) 2045 (22.989) is greater than 3.0 degrees C
151	5	339	2030	Precip difference from 5 (339) 2030 (.254) to 5 (339) 2045 (5.334) is greater than 5 mm
151	5	339	2230	Precip difference from 5 (339) 2230 (.254) to 5 (339) 2245 (8.128) is greater than 5 mm
151	6	340	445	Precip difference from 6 (340) 445 (1.524) to 6 (340) 500 (7.874) is greater than 5 mm
151	7	341	2100	Precip difference from 7 (341) 2100 (8.636) to 7 (341) 2115 (1.27) is greater than 5 mm
102	11	345	1900	Wind speed is less than 0.5 m/s from 11 (345) 1900 to 12 (346) 900
102	12	346	1900	Wind speed is less than 0.5 m/s from 12 (346) 1900 to 13 (347) 900
102	24	358	2100	Wind speed is less than 0.5 m/s from 24 (358) 2100 to 25 (359) 900
150	3	337	430	Wind direction is greater than 360 or less than 0 on 3 (337) 430 (-.09396)

12) Missing data:

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

January 2003
None

February 2003
None

March 2003
None

April 2003
None

May 2003
None

June 2003

None

July 2003
None

August 2003
None

September 2003
None

October 2003
None

November 2003
None

December 2003
None

13) Other remarks:

On 10/11/2023 this dataset was updated to include embedded QAQC flags for anomalous/suspect data. System-wide monitoring data beginning in 2007 were processed to allow for QAQC flags and codes to be embedded in the data files rather than detailed in the metadata alone (as in the anomalous/suspect, deleted, and missing data sections above). Prior to 2007, rejected data were deleted from the dataset so they are unavailable to be used at all, but suspect data were only noted in the metadata document. Suspect data flags <1> were embedded retroactively in order to allow suspect data to be easily identified and filtered from the dataset if desired for analysis and reporting purposes. No other flags or codes were embedded in the dataset and users should still refer to the detailed explanations above for more information.

Arrays:

During 2022 all pre-2007 weather data were revisited by the CDMO. Historically those datasets included 15 minute, hourly (60), and daily data arrays (144). As directed by the NERRS Data Management Committee, the CDMO removed the hourly and daily data arrays leaving only the 15 minute data to make the entire NERRS SWMP weather dataset consistent in its reporting. All references to the 60 and 144 arrays were left in the metadata document as they may still provide valuable information, but users should be aware that they are largely no longer relevant. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout the fall of 2022.

Precipitation:

During the initial years of NERRS SWMP weather data collection the CR10X programming was inconsistent in how precipitation values were recorded. For most reserves, zeros were not recorded when rainfall had not occurred between 2001-2003, instead no rainfall was represented by a blank cell. The CDMO verified which datasets were impacted by this issue for the 2001-2006 datasets and inserted zeros when the metadata indicated that no precipitation occurred and data were not missing for other reasons. In some cases, zero values for precipitation data were evaluated and removed where the metadata confirmed that no rainfall should have been in the dataset. The pre-2007 data did not go through a thorough QAQC process again at that time (in addition to previous QAQC); however, if discrepancies were noticed between what was documented in the metadata and what was in the dataset, additional updates may have been made. The updated datasets were uploaded to the database and made available through the various data applications at www.nerrsdata.org/get/landing.cfm throughout early 2023.

LiCor:

Prior to the installation of the new NERR_4.CSI program, all values less than 0 were altered in the raw data to read 0. These values may indicate an incorrect multiplier, calibration problems, or a sensor malfunction. Because these values are changed in the raw data, we cannot confirm that they are all valid data points.

Relative Humidity:

Prior to the installation of the new NERR_4.CSI program, all values over 100% were altered in the raw data to read 100%. These values may indicate super saturated air, calibration problems, or a sensor malfunction. Because these values are changed in the raw data, we cannot confirm that they are all valid data points. The site had many problems with the RH sensor but tried to make sure the data were as close to reality as possible. It is recommended to use this data with discretion.

Daily Rainfall Totals For: Jan 2003

2	1.016
3	.762
5	6.096
6	9.906
18	6.604
23	2.032
24	16.002
25	1.016
31	3.302

Monthly Total	46.7
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Daily Rainfall Totals For: Feb 2003

2	2.794
5	.762
7	4.572
8	2.540
10	.762
16	1.016
17	4.318
18	.254
20	1.270
21	5.080
25	3.048
27	4.826

Monthly Total	31.2
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Daily Rainfall Totals For: Mar 2003

2	.254
4	.508
10	.762
13	.254
18	1.524
19	18.034
20	.254
22	6.858
24	1.778
26	1.778

Monthly Total	32.0
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Daily Rainfall Totals For: Apr 2003

1	4.064
2	.508
3	1.524
4	.254
5	.254
8	3.556
9	11.176
10	3.810
11	19.558
12	10.922
13	4.826

14	10.160
15	5.080
16	5.334
17	62.992
18	31.242
19	1.524
20	2.286
23	.508
26	2.032

Monthly Total	181.6
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Daily Rainfall Totals For:	May	2003
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6	3.810
7	.254
8	3.810
13	4.572
14	14.224
18	3.048
19	1.778
20	9.652

Monthly Total	41.1
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Daily Rainfall Totals For:	Jun	2003
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2	4.064
3	1.778
6	17.780
7	13.462
15	1.778
19	8.890

Monthly Total	47.8
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Daily Rainfall Totals For:	Jul	2003
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1	.254
2	3.810
3	.762
4	.254
5	1.778
15	.254

16	.254
22	.508
27	5.842
28	1.524
31	1.524

Monthly Total	16.8
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Daily Rainfall Totals For: Aug 2003

1	10.922
2	3.556
6	3.302
7	1.778
9	1.016
11	.762
16	15.748
17	3.302
18	8.890
21	1.524
22	1.016
23	1.016
25	22.860
26	31.242
27	1.778
28	2.032
29	.254

Monthly Total	111.0
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Daily Rainfall Totals For: Sep 2003

1	7.620
2	1.270
4	.762
5	9.398
8	3.810
11	1.270
12	.508
15	6.604
16	.508
17	.508

Monthly Total	32.3
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Daily Rainfall Totals For: Oct 2003

9	36.322
10	108.458
11	.254
15	.254
21	2.794
23	4.826
24	1.270
26	1.270
30	10.160

Monthly Total	165.6
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Daily Rainfall Totals For: Nov 2003

1	1.016
2	2.540
6	8.890
7	33.020
8	1.778
9	9.652
10	39.624
11	221.234
12	161.290
13	51.054
14	6.604
15	11.430
16	6.604
17	7.366
18	1.270
19	4.826
22	10.160
24	.762

Monthly Total	579.1
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Daily Rainfall Totals For: Dec 2003

5	22.352
6	44.704
7	33.528
14	1.016
16	.254
17	.254

20	2.540
23	.762
27	1.524
Monthly Total	106.9