**Old Woman Creek (OWC) NERR Meteorological Metadata**

January- December 2003

Latest Update: **February 21, 2023**

**I. Data set and research descriptors**

1. **Principal investigator and contact person**

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1. **Entry Verification**
   1. Data input procedures

The 15 minute data, 1 hour average data, and the 24 hour data are downloaded from each instrument at the weather station to a Campbell Scientific CR10X datalogger (the CDMO Data Logger Program was loaded into the CR10X and controls the sensors and data collection schedule (See Part B of this section for the data collection schedule)). The CR10X is then interfaced with the PC208W software supplied by Campbell Scientific. The data are collected in a storage module and retrieved monthly and then downloaded into a computer containing the PC208W software. The data are also saved as a monthly raw data file (month01.dat) onto a CD.

From January through November, the files are converted to an Access database by the CDMO Weather Data Management Program (WDMP), after an entire month of data are available. This program was developed in Visual Basic to interface with the NERRS data collection schedule. The WDMP will automatically input and convert the monthly raw data files 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 Part C of this section). Finally, it produces error and summary reports. Any anomalous data are investigated and are noted below in the Anomalous Data section. Any data corrections that are performed are noted in the Data Anomalies/Missing Data section (section 8). Common errors noted in the monthly error reports were wind speeds below the 0.5 m/s criteria, temperature change of greater than 30 C in a 15-minute period, and the precipitation of greater than 5 mm in 15 minutes. Each of these common errors were checked and either accepted as valid or listed as anomalous data.

The new Data Logger Program (NERR\_4.CSI) was loaded into the CR10X on 3 December 2003 at 07:00. The raw file data collected after 3 December 2003 (07:00) were exported from PC208W in a comma-delimited format (.DAT file) and opened in Microsoft Excel for pre-processing with the EQWin format macro. The EQWin format macro was developed by the CDMO to reformat the header columns, insert station codes, insert a corrected time column and allow the technician to remove any pre- and post-deployment data from the file. The pre-processed file is then ready to be copied into the EQWin water.eqi file where the data are QA/QC checked and archived in a database. EQWin queries, reports and graphs are used to discover data set outliers (values which fall outside the range that the instrument is designed to measure) and large changes in the data. EQWin is also used to generate statistics, view graphs, create customized queries and reports of the data, cross query the water, weather and nutrient data and finally export the data to the CDMO. Any errors or anomalous data are noted and further examined and either deleted or noted in the metadata.

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 has 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.

* 1. Data collection schedules (i-vi with prior to installation of the NERR\_4.CSI program)

i) Data are collected in the following formats:

(a) Sample data points are collected every 15 minutes. With installation of program

NERR\_4.CSI, 15 minute averages are collected every 15 minutes.

(b) Hourly averages are collected every 60 minutes.

(c) Daily average, maximum with time, and minimum with time are collected every

24-hours.

ii) 15 minute sample point parameters include: Date, Time, Air Temperature (oC),

Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s),

Wind Direction (degrees), and Rainfall (mm).

iii) Hourly average parameters include: Date, Time, Air Temperature (oC), Relative

Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind

Direction (degrees), and Wind Direction Standard Deviation (using Yamartino's

Algorithm).

iv) Daily Average parameters include: Date, Time, Air Temperature (oC), Relative

Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), and Wind

Direction (degrees) (degrees).

v) Daily Maximum parameters include: Date, Time, Air Temperature (oC), Time,

Relative Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time,

Wind Speed (m/s), Time, Battery Voltage, and Time.

vi) Daily Minimum parameters: Date, Time, Air Temperature (oC), Time, Relative

Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time, Wind

Speed (m/s), Time, Battery Voltage, and Time.

vii) With installation of the new NERR\_4.CSI program, the following parameters were collected every 15 minutes, hourly and daily:

Year, Julian Date, Time, Average (c), Temperature Maximum Temperature (c),

Maximum Temperature Time, Minimum Temperature (c), Minimum Temperature Time,

Relative Humidity Average (%), Relative Humidity Max (%), Relative Humidity Max

Time, Relative Humidity Min (%), Relative Humidity Min Time, Barometric Pressure Average (mb), Barometric Pressure Max (mb), Barometric Pressure Max Time, Barometric Pressure Min (mb), Barometric Pressure Min Time, Wind Speed Average (m/s) Wind Direction Average (degrees), Wind Speed Std Dev (m/s), Wind Speed Maximum (m/s), Wind Speed Maximum Time, Wind Speed Minimum

(m/s), Wind Speed Minimum Time, Precipitation Total (mm), PAR Total (millimoles/M2), Voltage Average (volts), Total Radiation (Langleys/Minute), Cumulative Rainfall (mm)

* 1. Error/anomalous data criteria (prior to installation of the new NERR\_4.CSI program)

**Air Temperature**:

- 15-minute sample not greater than maximum for the day

- 15-minute sample not less than minimum for the day

- 15-minute sample not greater than 30 C different from the previous 15-minute reading

- Maximum and minimum temperatures recorded for the day

- 1 hour average is not greater than 10%above the highest 15-minute reading recorded in the hour

**Relative Humidity**:

-Difference less than 25% change from the previous 15-minutes

- Maximum and minimum relative humidity recorded for the day

- 1 hour average not greater than 10% above the highest 15-minute reading recorded

**Rainfall**:

- Precipitation not greater than 5 mm in 15-minute period

- No precipitation for the month

**Wind Speed**:

- Wind speed greater than 30 m/s

- Wind speed less than 0.5 m/s

**Wind Direction**:

- Wind direction greater than 3600

- Wind direction less than 00

**Barometric Pressure**:

- Pressure not greater than 1040 mb nor less than 980 mb (manually corrected to 1020-960 to compensate for difference in elevation of Old Woman Creek from other reserves)

- Pressure changes greater than 5 mb per hour

- Maximum and minimum values recorded for the day

- 1 hour average not greater than 10% above the highest 15-minute reading in the hour

**Time**:

- 15-minute interval recorded

**For all data**:

* Duplicate interval data

1. **Research objectives**

The objective of this work is to record the data over a long time period for Old Woman Creek to look at long term trends and seasonal variability in weather conditions. An added function is to provide the weather data necessary for researchers to examine the impact of changing weather conditions on the ecology of the estuary. Since this estuary is a storm driven system and the source of water in the estuary is a function of both storm activity in the watershed and on the lake proper, weather information is critical when studying the estuary.

1. **Research methods (Campbell Weather Station)**

The Wind Sentry, temperature and relative humidity sensor, barometric sensor and the LiCor PAR sensor are located on a 10-meter tower following the descriptions outlined in the CDMO Manual V 4.0. The tipping rain gauge is located about 5 meters southeast of the tower. The sensors are wired to the CR10X in accordance with the sensor manuals.

The Campbell weather station samples every 5 seconds to produce both hourly and daily averages of air temperature, relative humidity, barometric pressure, rainfall, wind speed and direction, and PAR prior to installation of the NERR\_4.CSI program. An instantaneous sample is taken every 15 minutes and is stored in array 150 and 151. The data are stored onsite in a SM4M storage module. The modules are swapped at monthly intervals and the data are then downloaded into a computer for processing (see data input section 2). When the storage module is changed, usually once a month, the sensors on the weather station are inspected for damage and cleaned, if necessary. All sensors except the rainfall collector are sent to Campbell Scientific for recalibration at least every two years. When the storage module is changed, a handheld Kestrel 4000 is run to provide a general check of the sensors.

1. **Site location and character**

The Old Woman Creek State Nature Preserve and National Estuarine Research Reserve is located on the southern shore of Lake Erie east of the City of Huron, Ohio. The reserve lies within the Lake Erie Biogeographic Region. Old Woman Creek drains a primarily agricultural watershed with corn, soybeans, and winter wheat being the most important crops. The weather station is located within the boundaries of the reserve, due east of the parking lot at the Ohio Center for Coastal Research in a field that is cut annually or biennially. This ensures that there is no tall vegetation that would interfere with the weather station. The tower is located within a fenced (6 foot chain link fencing) enclosure about 5 meters square. The enclosure has a gravel base. The coordinates of the station are 410 22’40” N and 820 30’ 29”W. Wind speed and wind direction sensors are atop a 10 meter tower, while the PAR sensor is located off of the south-west edge of the tower at approximately 3 meters in height.

1. **Data collection period**

Weather data were collected from 1 January though the end of December, 2003.

1. **Distribution**

NOAA/ERD retains the right to analyze, synthesize, and publish summaries of the NERRS System-wide Monitoring Program data. The OWC Research Coordinator (RC) retains the right to be fully credited for having collected and processed the data. Following academic courtesy standard, the RC and the 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.

The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined in the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government and the State of Ohio do not assume liability to the Recipient or third persons, nor will the Federal government or the State of Ohio reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

NERR water quality 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 general information link on CDMO homepage) an online at the CDMO homepage http://cdmo.baruch.sc.edu/. Data are available in text tab-delimited format, Microsoft Excel spreadsheet format and comma-delimited format from the CDMO.

1. **Associated research and monitoring project**

The four SWMP data loggers are located within 1 and ½ kilometers of this weather station. The two sites were established to determine the role of the estuary in mitigating storm flow though the system and the impact of Lake Erie on the estuary. Samples for nutrient analysis are also collected at these sites when the data loggers are swapped out.

1. **Sensor specifications, operating range, accuracy, date of last calibration**

Parameter: PAR (Photosynthetic Active Radiation)

Units: mmoles m-2 (total flux)

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

Model LiCor Quantum Sensor#LI190SB

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per 0C maximum

Stability: <+2% change over 1 year

Operating Temperature: -400 to +650 C

Sensitivity: typically 5 microA per 1000 micromoles/second/meter2

Light Spectrum Wavelength: 400 to 700 nm

Date of Last Calibration: January 18, 2001

Changed sensor on 23 April, 2003- date of calibration October 16, 2002

Parameter: Wind speed

Units: meters per second (ms-1)

Sensor type: 12 cm diameter cup wheel assembly, 40 mm diameter hemispherical cups

Model RM Young Wind Sentry #03001

Range: 0-50 m/s; gust survival 60 m/s

Accuracy: + 0.5ms-1

Date of Last Calibration: unknown; date of purchase- March 30, 2001

Changed sensor on 23 April, 2003- date of calibration 28 February, 2003

Parameter: Wind direction

Units: degrees

Sensor type: balanced vane, 16 cm turning radius

Model RM Young Wind Sentry #03001

Range: 3600 mechanical, 3550 electrical (50 open)

Accuracy: + 5%

Date of Last Calibration: unknown; date of purchase- March 30, 2001

Changed sensor on 23 April, 2003- date of calibration 28 February, 2003

Parameter: Temperature

Units: degrees Celsius

Sensor type: Platinum resistance temperature detector (PRT)

Model: Vaisala HMP45C Temperature and Relative Humidity Probe

Operating Temperature: -400C to +600C

Accuracy: + 0.20C at 200C

Date of Last Calibration: March 2, 2001

Changed sensor on 2 November- date of calibration of new sensor 19 July, 2002

Changed sensor on 23 April 2003- date of calibration of new sensor 26 February, 2003

Parameter: Relative Humidity

Units Percent

Sensor type: Vaisala HUMICAP© capacitive relative humidity sensor

Model: Vaisala HMP45C Temperature and Relative Humidity Probe

Range: 0-100% non-condensing

Accuracy: +/- 2% RH (0-90%) and +/- 3% RH (90-100%)

Temperature dependence of RH measurement: + 0.05% RH/0C

Date of Last Calibration: March 2, 2001

Changed sensor on 2 November- date of calibration of new sensor 19 July, 2002

Changed sensor on 23 April 2003- date of calibration of new sensor 26 February, 2003

Parameter: Barometric Pressure

Units: millibars (mb)

Sensor type Vaisala Barocap© silicon capacitive pressure sensor

Model #Vaisala PTB 101B (Campbell Scientific #CS-105

Operating Range: Pressure 600-1060 mb

Temperature Range: -400 to + 600C

Humidity: non-condensing

Accuracy: + 0.5mb at 200C; + 2mb at 00C to 400C; + 4mb at –200C to 450C; + 6mb at –400C to 600C

Stability: + 0.1 mb per year

Date of Last Calibration: August 28, 2000

Changed sensor on 23 April, 2003- date of calibration of new sensor 5 March, 2003

Parameter: Precipitation (heated rain gauge)

Units: millimeters (mm)

Sensor Tipping Bucket Rain Gauge

Model#: Met One Model 385Heated Rain Gauge

Sensitivity: 0.2mm

Accuracy: +1% at 25 to 76 mm per hour at 210C

Date of Last Calibration: January 24, 2001

Checked and calibrated on 23 April, 2003

Storage Module

Model #: SM4M

Storage capacity: 2 million low-resolution data values

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

Processor: Hitachi H8S

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

Operating range: temperature: -350C to +650C

Baud rates: 9600, 76800

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

Power requirements: 5 + 0.3 VDC at 100 mA

Campbell Scientific CR10X Wiring Panel has 128K of flash memory (EEPROM), in which it stores the operating system and its program (used to run the weather station). Additionally, there are 128K of SRAM, which is used to run the program and store measurements and final data.

1. **Coded variable indicator and variable code definitions:**

owcowmet = Old Woman meteorological station

1. **Data anomalies/suspect 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](http://www.nerrsdata.org/get/landing.cfm) throughout the fall of 2022.

Anomalous data criteria for Barometric Pressure (mb) are corrected for the difference in elevation at Old Woman Creek; not greater than 1020 mb and not less than 960 mb. Hence pressure readings less than 980 mb are *not* flagged as anomalous/suspect data.

**January 2003**:

The following data appear to be correct and were flagged by the weather program:

150 30 30 2330 Air temp difference from 30 ( 30) 2330 (-13.626) to 30 ( 30) 2345 (-9.8302) is greater than 3.0 degrees C

**February 2003**:

None

**March 2003**:

The following data appear to be correct and were flagged by the weather program:

Array ID Date Day Time Error Message

150 2 61 1400 Air temp difference from 2 ( 61) 1400 ( 1.4893) to 2 ( 61) 1415 (-2.5) is greater than 3.0 degrees C

150 8 67 1745 Air temp difference from 8 ( 67) 1745 ( 10.703) to 8 ( 67) 1800 (4.2567) is greater than 3.0 degrees C

150 8 67 2030 Air temp difference from 8 ( 67) 2030 ( 4.075) to 8 ( 67) 2045 (-.91079) is greater than 3.0 degrees C

150 12 71 1230 Air temp difference from 12 ( 71) 1230 ( 11.296) to 12 ( 71) 1245 (7.7741) is greater than 3.0 degrees C

150 14 73 2215 Air temp difference from 14 ( 73) 2215 ( .04655) to 14 ( 73) 2230 (3.1731) is greater than 3.0 degrees C

150 15 74 1400 Air temp difference from 15 ( 74) 1400 ( 14.733) to 15 ( 74) 1415 (10.681) is greater than 3.0 degrees C

150 17 76 800 Air temp difference from 17 ( 76) 800 ( 13.773) to 17 ( 76) 815 ( 10.05) is greater than 3.0 degrees C

150 17 76 1015 Air temp difference from 17 ( 76) 1015 ( 14.675) to 17 ( 76) 1030 (11.085) is greater than 3.0 degrees C

150 19 78 1615 Air temp difference from 19 ( 78) 1615 ( 5.7375) to 19 ( 78) 1630 (14.047) is greater than 3.0 degrees C

150 20 79 1930 Air temp difference from 20 ( 79) 1930 ( 14.086) to 20 ( 79) 1945 (9.4352) is greater than 3.0 degrees C

150 25 84 815 Air temp difference from 25 ( 84) 815 ( 15.415) to 25 ( 84) 830 (11.628) is greater than 3.0 degrees C

150 27 86 2200 Air temp difference from 27 ( 86) 2200 ( 4.4149) to 27 ( 86) 2215 (12.261) is greater than 3.0 degrees C

150 28 87 2015 Air temp difference from 28 ( 87) 2015 ( 18.718) to 28 ( 87) 2030 (14.135) is greater than 3.0 degrees C

150 8 67 1745 Rel hum difference from 8 ( 67) 1745 ( 55.886) to 8 ( 67) 1800 (84.128) is greater than 25%

150 14 73 2215 Rel hum difference from 14 ( 73) 2215 ( 93.132) to 14 ( 73) 2230 (65.591) is greater than 25%

150 19 78 1615 Rel hum difference from 19 ( 78) 1615 ( 86.157) to 19 ( 78) 1630 (57.504) is greater than 25%

150 25 84 2215 Rel hum difference from 25 ( 84) 2215 ( 96.51) to 25 ( 84) 2230 (70.322) is greater than 25%

150 27 86 2200 Rel hum difference from 27 ( 86) 2200 ( 86.436) to 27 ( 86) 2215 (49.003) is greater than 25%

102 13 72 800 Wind speed is less than 0.5 m/s from 13 ( 72) 800 to 14 ( 73) 1200

**April 2003**:

The following data appears to be correct and were flagged by the weather program

150 20 110 1630 Air temp difference from 20 ( 110) 1630 ( 23.679) to 20 ( 110) 1645 (15.777) is greater than 3.0 degrees C

150 28 118 2145 Air temp difference from 28 ( 118) 2145 ( 20.246) to 28 ( 118) 2200 (12.873) is greater than 3.0 degrees C

150 30 120 1230 Air temp difference from 30 ( 120) 1230 ( 24.011) to 30 ( 120) 1245 (11.129) is greater than 3.0 degrees C

150 30 120 2100 Air temp difference from 30 ( 120) 2100 ( 16.868) to 30 ( 120) 2115 (11.154) is greater than 3.0 degrees C

150 2 92 1815 Rel hum difference from 2 ( 92) 1815 ( 46.828) to 2 ( 92) 1830 (84.091) is greater than 25%

150 14 104 45 Rel hum difference from 14 ( 104) 45 ( 80.08) to 14 ( 104) 100 (45.627) is greater than 25%

150 16 106 1100 Rel hum difference from 16 ( 106) 1100 ( 34.263) to 16 ( 106) 1115 (65.604) is greater than 25%

150 20 110 1630 Rel hum difference from 20 ( 110) 1630 ( 52.191) to 20 ( 110) 1645 (86.321) is greater than 25%

150 30 120 1230 Rel hum difference from 30 ( 120) 1230 ( 38.911) to 30 ( 120) 1245 (70.319) is greater than 25%

101 6 96 2100 Air temp average in 1 hour data (-.04897) is less than 15 minute minimum (-.02662) by at least 10%

101 8 98 2000 Air temp average in 1 hour data ( .09204) is less than 15 minute minimum ( .10355) by at least 10%

150 2 92 1815 Air temp difference from 2 ( 92) 1815 ( 17.854) to 2 ( 92) 1830 (6.7617) is greater than 3.0 degrees C

150 16 106 1100 Air temp difference from 16 ( 106) 1100 ( 25.737) to 16 ( 106) 1115 (11.527) is greater than 3.0 degrees C

150 17 107 2400 Air temp difference from 17 ( 107) 2400 ( 7.2586) to 18 ( 108) 15 (10.914) is greater than 3.0 degrees C

150 19 109 1230 Air temp difference from 19 ( 109) 1230 ( 23.015) to 19 ( 109) 1245 (17.039) is greater than 3.0 degrees C

150 19 109 1400 Air temp difference from 19 ( 109) 1400 ( 16.193) to 19 ( 109) 1415 (19.448) is greater than 3.0 degrees C

150 19 109 1430 Air temp difference from 19 ( 109) 1430 ( 17.655) to 19 ( 109) 1445 (23.235) is greater than 3.0 degrees C

150 19 109 1500 Air temp difference from 19 ( 109) 1500 ( 22.836) to 19 ( 109) 1515 (16.725) is greater than 3.0 degrees C

150 19 109 1930 Air temp difference from 19 ( 109) 1930 ( 12.635) to 19 ( 109) 1945 (17.019) is greater than 3.0 degrees C

**May 2003**:

The following data appear to be correct:

Array ID Date Day Time Error Message

150 1 121 1000 Air temp difference from 1 ( 121) 1000 ( 26.276) to 1 ( 121) 1015 (21.556) is greater than 3.0 degrees C

150 1 121 1015 Air temp difference from 1 ( 121) 1015 ( 21.556) to 1 ( 121) 1030 (16.906) is greater than 3.0 degrees C

150 9 129 1245 Air temp difference from 9 ( 129) 1245 ( 21.968) to 9 ( 129) 1300 (15.257) is greater than 3.0 degrees C

150 9 129 2200 Air temp difference from 9 ( 129) 2200 ( 19.859) to 9 ( 129) 2215 (16.068) is greater than 3.0 degrees C

150 9 129 2300 Air temp difference from 9 ( 129) 2300 ( 17.003) to 9 ( 129) 2315 (24.117) is greater than 3.0 degrees C

150 9 129 2330 Air temp difference from 9 ( 129) 2330 ( 24.046) to 9 ( 129) 2345 (19.121) is greater than 3.0 degrees C

150 11 131 730 Air temp difference from 11 ( 131) 730 ( 22.637) to 11 ( 131) 745 (17.921) is greater than 3.0 degrees C

150 9 129 2300 Rel hum difference from 9 ( 129) 2300 ( 86.169) to 9 ( 129) 2315 (35.48) is greater than 25%

150 9 129 2330 Rel hum difference from 9 ( 129) 2330 ( 39.929) to 9 ( 129) 2345 (70.414) is greater than 25%

151 7 127 630 Precip difference from 7 ( 127) 630 ( 1.016) to 7 ( 127) 645 ( 8.382) is greater than 5 mm

151 7 127 645 Precip difference from 7 ( 127) 645 ( 8.382) to 7 ( 127) 700 ( 2.54) is greater than 5 mm

151 20 140 1345 Precip difference from 20 ( 140) 1345 ( 1.27) to 20 ( 140) 1400 ( 6.604) is greater than 5 mm

151 20 140 1400 Precip difference from 20 ( 140) 1400 ( 6.604) to 20 ( 140) 1415 ( .254) is greater than 5 mm

**June 2003**:

The following data appear to be correct:

Array ID Date Day Time Error Message

150 1 121 1000 Air temp difference from 1 ( 121) 1000 ( 26.276) to 1 ( 121) 1015 (21.556) is greater than 3.0 degrees C

150 1 121 1015 Air temp difference from 1 ( 121) 1015 ( 21.556) to 1 ( 121) 1030 (16.906) is greater than 3.0 degrees C

150 9 129 1245 Air temp difference from 9 ( 129) 1245 ( 21.968) to 9 ( 129) 1300 (15.257) is greater than 3.0 degrees C

150 9 129 2200 Air temp difference from 9 ( 129) 2200 ( 19.859) to 9 ( 129) 2215 (16.068) is greater than 3.0 degrees C

150 9 129 2300 Air temp difference from 9 ( 129) 2300 ( 17.003) to 9 ( 129) 2315 (24.117) is greater than 3.0 degrees C

150 9 129 2330 Air temp difference from 9 ( 129) 2330 ( 24.046) to 9 ( 129) 2345 (19.121) is greater than 3.0 degrees C

150 11 131 730 Air temp difference from 11 ( 131) 730 ( 22.637) to 11 ( 131) 745 (17.921) is greater than 3.0 degrees C

150 9 129 2300 Rel hum difference from 9 ( 129) 2300 ( 86.169) to 9 ( 129) 2315 (35.48) is greater than 25%

150 9 129 2330 Rel hum difference from 9 ( 129) 2330 ( 39.929) to 9 ( 129) 2345 (70.414) is greater than 25%

151 7 127 630 Precip difference from 7 ( 127) 630 ( 1.016) to 7 ( 127) 645 ( 8.382) is greater than 5 mm

151 7 127 645 Precip difference from 7 ( 127) 645 ( 8.382) to 7 ( 127) 700 ( 2.54) is greater than 5 mm

151 20 140 1345 Precip difference from 20 ( 140) 1345 ( 1.27) to 20 ( 140) 1400 ( 6.604) is greater than 5 mm

151 20 140 1400 Precip difference from 20 ( 140) 1400 ( 6.604) to 20 ( 140) 1415 ( .254) is greater than 5 mm

**July 2003**:

All data missing from 1200 July 23, 2003 through the end of the month due to problems with both software and hardware

The following data appear to be correct:

Array ID Date Day Time Error Message

150 4 185 1230 Air temp difference from 4 ( 185) 1230 ( 32.496) to 4 ( 185) 1245 (21.343) is greater than 3.0 degrees C

150 5 186 1445 Air temp difference from 5 ( 186) 1445 ( 28.791) to 5 ( 186) 1500 (24.21) is greater than 3.0 degrees C

150 8 189 1330 Air temp difference from 8 ( 189) 1330 ( 31.237) to 8 ( 189) 1345 (28.183) is greater than 3.0 degrees C

150 18 199 1900 Air temp difference from 18 ( 199) 1900 ( 16.393) to 18 ( 199) 1915 (19.59) is greater than 3.0 degrees C

150 4 185 1230 Rel hum difference from 4 ( 185) 1230 ( 52.314) to 4 ( 185) 1245 (92.479) is greater than 25%

150 18 199 1900 Rel hum difference from 18 ( 199) 1900 ( 88.077) to 18 ( 199) 1915 (59.988) is greater than 25%

151 4 185 1245 Precip difference from 4 ( 185) 1245 ( 16.51) to 4 ( 185) 1300 ( 6.604) is greater than 5 mm

151 4 185 1300 Precip difference from 4 ( 185) 1300 ( 6.604) to 4 ( 185) 1315 ( .254) is greater than 5 mm

151 8 189 245 Precip difference from 8 ( 189) 245 ( 6.858) to 8 ( 189) 300 ( 1.27) is greater than 5 mm

151 10 191 915 Precip difference from 10 ( 191) 915 ( 3.048) to 10 ( 191) 930 ( 8.382) is greater than 5 mm

151 10 191 930 Precip difference from 10 ( 191) 930 ( 8.382) to 10 ( 191) 945 ( 1.27) is greater than 5 mm

**August 2003**:

No weather data were collected during this month due to problems with both software and hardware

**September 2003**:

No weather data were collected during this month due to problems with both software and hardware

**October 2003**:

No weather data were collected during this month due to problems with both software and hardware until 05:45 on 14 October, 2003 (day 287). The hourly data for 06:00 on 14 October and the daily totals, minimums, averages, and maxima for 14 October were removed

The following data appears to be correct and were flagged by the weather program

Array ID Date Day Time Error Message

150 16 289 2145 Air temp difference from 16 ( 289) 2145 ( 6.1436) to 16 ( 289) 2200 (10.066) is greater than 3.0 degrees C

150 17 290 715 Air temp difference from 17 ( 290) 715 ( 7.6573) to 17 ( 290) 730 (10.914) is greater than 3.0 degrees C

150 19 292 330 Air temp difference from 19 ( 292) 330 ( 7.1409) to 19 ( 292) 345 (10.798) is greater than 3.0 degrees C

150 16 289 2145 Rel hum difference from 16 ( 289) 2145 ( 96.941) to 16 ( 289) 2200 (70.279) is greater than 25%

150 17 290 645 Rel hum difference from 17 ( 290) 645 ( 42.009) to 17 ( 290) 700 (72.251) is greater than 25%

150 25 298 500 Rel hum difference from 25 ( 298) 500 ( 55.301) to 25 ( 298) 515 (83.283) is greater than 25%

**November 2003**: The following data appears to be correct:

The following data appears to be correct and were flagged by the weather program

Array ID Date Day Time Error Message

150 5 309 915 Air temp difference from 5 ( 309) 915 ( 19.117) to 5 ( 309) 930 ( 14.998) is greater than 3.0 degrees C

150 24 328 400 Air temp difference from 24 ( 328) 400 ( 16.877) to 24 ( 328) 415 (13.688) is greater than 3.0 degrees C

151 12 316 1645 Precip difference from 12 ( 316) 1645 ( .254) to 12 ( 316) 1700 ( 7.874) is greater than 5 mm

151 12 316 1700 Precip difference from 12 ( 316) 1700 ( 7.874) to 12 ( 316) 1715 (1.016) is greater than 5 mm

150 8 312 430 Wind direction is greater than 360 or less than 0 on 8 ( 312) 430

(-.09445). Value was converted to zero in the data set.

**12. Deleted 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](http://www.nerrsdata.org/get/landing.cfm) throughout the fall of 2022.

**January 2003**: there were no deleted data

**February 2003**: there were no deleted data

**March 2003**: there were no deleted data

**April 2003**:

The following data were deleted due to changing sensors:

Array ID Date Day Time

101 23 113 1200 101 Array data from 23 ( 113) 1200 to 23 ( 113) 1200

102 23 113 1200 102 Array from 23 ( 113) 1200 to 23 ( 113) 1200

241 23 113 2400 241 Array from 23 ( 113) 2400 to 23 ( 113) 2400

242 23 113 2400 242 Array from 23 ( 113) 2400 to 23 ( 113) 2400

243 23 113 2400 243 Array data from 23 ( 113) 2400 to 23 ( 113) 2400

244 23 113 2400 244 Array data from 23 ( 113) 2400 to 23 ( 113) 2400

**May 2003-September 2003**: there were no deleted data

**October 2003**:

101 14 287 600 101 Array data from 14 ( 287) 600 to 14 ( 287) 600

241 14 287 2400 241 Array from 14 ( 287) 2400 to 14 ( 287) 2400

242 14 287 2400 242 Array from 14 ( 287) 2400 to 14 ( 287) 2400

243 14 287 2400 243 Array data from 14 ( 287) 2400 to 14 ( 287) 2400

244 14 287 2400 244 Array data from 14 ( 287) 2400 to 14 ( 287) 2400

**November 2003-December 2003**: there were no deleted data

**13. 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](http://www.nerrsdata.org/get/landing.cfm) throughout the fall of 2022.

**January 2003-March 2003**: there appears to be no missing data

**April 2003**: The following data are missing due to changing sensors:

Array ID Date Day Time Error Message

150 23 113 915 Missing 150 Array data (15 minute data) from 23 ( 113) 915 to 23 (113) 1130

101 23 113 1000 Missing 101 Array data (Hourly Averages) from 23 ( 113) 1000 to 23 (113) 1100

102 23 113 1000 Missing 102 Array data (Hourly Average Wind Parameters) from 23 (113) 1000 to 23 ( 113) 1100

**May 2003-June 2003**: there appears to be no missing data

**July 2003**: all data after 12:00 on July 23, 2003 is missing due to software/hardware incompatibility

**August 2003-Sepetember 2003**: all data are missing due to software/hardware incompatibility

**October 2003**: data are missing from 1 October 2003, at 00:00:00 through 14 October, 2003 at 05:45:00 due to software/hardware incompatibility

**November 2003-December 2003**: there appears to be no missing data

1. **Other remarks:**

**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](http://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](http://www.nerrsdata.org/get/landing.cfm) throughout early 2023.

Daily, Monthly, and Annual Precipitation Totals

**Date Precipitation in mm**

**January 2003**:

1. .51
2. 2.03
3. .25
4. 2.03
5. .25
6. 2.79

28 3.30

1. 1.52

January total: 12.70

**February 2003**:

1. .76

3 3.81

4 .51

1. .51
2. 1.27
3. 1.52
4. .25

22 23.88

1. 4.57
2. 1.52

February total: 38.61

**March 2003**:

1. 1.52
2. 8.38
3. 1.78

12 .51

1. 14.22
2. 1.27
3. 2.03
4. .51
5. 5.08
6. 11.18

28 3.08

1. 10.92

March total: 60.45

**April 2003**:

1. 1.52

4 43.69

1. 1.27

7 8.64

1. 6.10
2. .76

April total : 62.0

**May 2003**:

1. 12.95
2. 13.21

7 18.54

8 .25

1. 19.30
2. 2.54
3. 3.05
4. 6.35
5. .76
6. 27.94

27 4.32

1. .25
2. .76
3. 29.97

May total: 140.3

**June 2003**:

3 2.54

4 .25

1. .25
2. 22.35
3. .51
4. 14.22
5. 11.18
6. 1.02
7. 11.68
8. .51
9. 1.52

June total: 66.0

**July 2003**: No data available after 23 July

1. 24.13
2. .25
3. 14.2
4. 15.75
5. 5.08
6. 22.86
7. 6.35
8. .51
9. 33.02

total through 23 July 122.2

**August 2003**: No data available

**September 2003**: No data available

**October 2003**: No data before 14 October

1. 17.02
2. 19.81
3. 11.43

28 3.56

1. 3.30

total after 14 October: 55.1

**November 2003**:

11 10.41

12 11.18

1. .25

15 1.78

16 1.02

1. 6.35
2. 2.79
3. 3.56
4. 23.88
5. 22.35

November total 83.6

**December 2003**:

1. 6.6

10 8.4

14 5.8

16 2.0

19 0.5

22 3.6

23 20.8

1. 7.6
2. 1.8
3. 18.5

30 1.5

December total: 77.1