Old Woman Creek (OWC) NERR Meteorological Metadata

January- December 2002

Latest Update: **February 15, 2023**

I. DATA SET AND RESEARCH DESCRIPTORS

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2. Entry Verification

a) 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 is collected in a storage

module and retrieved monthly and then downloaded into a computer containing

the PC208W software. The data is also saved as a monthly raw data file

(month01.dat) onto a Jazz Disc Drive.

After an entire month of data are available, the files are converted to an

Access database by the CDMO Weather Data Management Program (WDMP). 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 3 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. David

Klarer performed all data management and data collection.

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.

b) Data Collection Schedule

i) Data is collected in the following formats:

1) 15 minute data are instantaneous readings except for PAR and

precipitation data that are totalized from 5 second samples sorted

by date and time. (Arrays 150 and 151)

2) Hourly averages (Arrays 101 and 102) are calculated from 5 second

samples sorted by date and time except for PAR and precipitation

data that are hourly totals calculated from 15 minute totals (Arrays

105 and 106).

3) Daily average (arrays 241 and 242), maximum with time, and

minimum with time (arrays 243 and 244) are calculated from 5 second

samples sorted by date and time except for PAR and precipitation

data which are 24 hour totals calculated from hourly totals (arrays

245 and 246).

ii) 15 minute sample point parameters: Date, Time, Air Temperature (°C),

Relative Humidity (%), LiCor (PAR), Barometric Pressure (mb), Wind Speed

(m/s), Wind Direction (Array 150); Rainfall (mm) (Array 151)

iii) Hourly average parameters: Date, Time, Air Temperature (°C), Relative

Humidity (%), Barometric Pressure (mb) (Array 101); Wind Speed (m/s), Wind

Direction, Wind Speed Maximum (Array 102)

iv) Hourly total parameters: LiCor (PAR) (Array 105); Rainfall (mm) (Array

106)

v) Daily Average parameters: Date, Time, Air Temperature (°C), Relative

Humidity (%), Barometric Pressure (mb) (Array 241); Wind Speed (m/s), Wind

Direction, Wind Direction Standard Deviation (using Yamartino's Algorithm)

(Array 242)

vi) Daily Total parameter: LiCor (PAR) (Array 245); Rainfall (mm) (Array

246)

vii) Daily Maximum parameters: Date, Time, Air Temperature (°C), Time,

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

Time, Wind Speed (m/s), Time, Battery Voltage, Time (Array 243)

viii) Daily Minimum parameters: Date, Time, Air Temperature (°C), Time,

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

Time, Wind Speed (m/s), Time, Battery Voltage, Time (Array 244)

c) Error/Anomalous Data Criteria

Air Temp:

- 15 min sample greater than max for the day

- 15 min sample less than the min for the day

- 15 min sample greater than 3.0 °C from the previous 15 minutes

- Max and Min values not recorded for the day

- 1-hour average greater than 10% above the greatest 15 min sample

recorded in the hour

Relative Humidity:

- Changed by more than 25% from the previous 15 minutes

- Max and Min values not recorded for the day

- 1-hour average greater than 10% above the greatest 15 min sample

recorded in the hour

Rainfall:

- Precipitation greater than 5 mm in 15 minutes

- 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 360 degrees

- Wind direction less than 0 degrees

Pressure:

- Pressure greater than 1040 mb or less than 980 mb (manually corrected to

1020-960 to compensate for difference in elevation of Old Woman Creek)

- Pressure changes greater than 5 mb per hour

- Max and Min values not recorded for the day

- 1-hour average greater than 10% above the greatest 15 min sample

recorded in the hour

Time:

- 15-minute interval not recorded

For all data:

- Duplicate interval data

3. 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.

4. 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 following the

protocol in the CDMO Manual.

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. An instantaneous sample

is taken every 15 minutes and is stored in array 150 and 151. The data is

stored onsite in a SM4M storage module. The modules are swapped at monthly

intervals and the data is then downloaded into a computer for processing (see

data input section 2). Periodically, sensors on the weather station are

inspected for damage and cleaned, if necessary. Sensors are sent to Campbell

Scientific for recalibration at least every two years.

5. 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. 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. The coordinates of the station are 41 deg

22'40" N and 82 deg 30' 29"W.

6. Data Collection Period

Weather data was collected from 1 January though the end of December 2002.

Collection for submission to the CDMO at this site began in May 2001.

7. 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.

8. Associated Research and Monitoring Project

The two 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.

9. Sensor specifications, operating range, accuracy, date of last calibration

LiCor Quantum Sensor

Model #LI190SB

Stability: <+2% change over 1 year

Operating Temperature: -40 to +65 C

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

Light Spectrum Wavelength: 40 to 70 nm

Date of Last Calibration: January 18,2001

Wind Sentry

Model #03001

Range: 0-50 m/s; 0-360 mechanical

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

Temperature and Relative Humidity

Model # HMP45C

Operating Temperature Range: -40 to + 60C

Temperature Measurement Range: -40 to + 60C

Temperature Accuracy: + 0.2C @ 20C

Relative Humidity Measurement Range: 0-100% non-condensing

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

Date of Last Calibration: March 2, 2001

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

Barometric Sensor

Model #Vaisala PTB 101B

Operating Range: Pressure 600-1060 mb

Temperature Range: -40 to + 60C

Humidity: non-condensing

Accuracy: + 4.0 mb (-40 to +60C)

Stability: + 0.1 mb per year

Date of Last Calibration: August 28, 2000

Tipping Bucket Rain Gauge

Model#: Met One Model 385 Heated Rain Gauge

Sensitivity: 0.2mm

Accuracy: +1% at 25 to 76 mm per hour at 21° C

Date of Last Calibration: January 24, 2001

10. Coded variable indicator and variable code definitions:

OW=Old Woman Creek weather station

**11. Data Anomalies/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.

Please note that the temperature/relative humidity probe suffered infrequent

intermittent failure from May 2002 through November 2, 2002 when the HMP45 probe

was replaced. During these intermittent failures, the 15 minute (150) data was

affected as well as the daily minimum (244) data, however the hourly averages

(101), daily averages (241) and the daily maximums (243) appeared to be

unaffected unless otherwise noted.

January 2002:

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

150 24 24 445 Air temp difference from 24 ( 24) 445 ( 8.8534)

to 24 ( 24) 500 ( 2.2067) is greater than 3.0 degrees C

150 29 29 900 Air temp difference from 29 ( 29) 900 ( 14.219)

to 29 ( 29) 915 ( 5.9801) is greater than 3.0 degrees C

102 18 18 1800 Wind speed is less than 0.5 m/s from 18 ( 18)

1800 to 19 ( 19) 800

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

101 11 11 2000 Air temp average in 1 hour data ( -.1918) is

greater than 15 minute maximum ( -.22615) by at least 10%

101 12 12 2300 Air temp average in 1 hour data ( .49028) is

greater than 15 minute maximum ( .43874) by at least 10%

101 13 13 300 Air temp average in 1 hour data ( .0568) is

greater than 15 minute maximum ( .03989) by at least 10%

101 30 30 0800 Air temp average in 1 hour data ( .0376) greater

than 15 minute maximum ( .03309) by at least 10%

101 30 30 1000 Air temp average in 1 hour data ( .08337) is less

than 15 minute minimum ( .09962) by at least 10%

101 30 30 1200 Air temp average in 1 hour data (-.04071) is less

than 15 minute minimum (-.03068) by at least 10%

February 2002

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

150 9 40 1600 Air temp difference from 9 ( 40) 1600 ( 13.475)

to 9 ( 40) 1615 ( 5.2419) is greater than 3.0 degrees C

150 9 40 1600 Rel hum difference from 9 ( 40) 1600 ( 40.92) to

9 ( 40) 1615 ( 74.473) is greater than 25%

150 12 43 2115 Rel hum difference from 12 ( 43) 2115 ( 66.157)

to 12 ( 43) 2130 ( 96.343) is greater than 25%

150 19 50 2200 Rel hum difference from 19 ( 50) 2200 ( 85.614)

to 19 ( 50) 2215 ( 56.301) is greater than 25%

March 2002:

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

150 9 68 1445 Air temp difference from 9 ( 68) 1445 ( 16.08)

to 9 ( 68) 1500 ( 6.9103) is greater than 3.0 degrees C

150 14 73 2015 Air temp difference from 14 ( 73) 2015 ( 6.476)

to 14 ( 73) 2030 ( 9.734) is greater than 3.0 degrees C

150 14 73 2030 Air temp difference from 14 ( 73) 2030 ( 9.734)

to 14 ( 73) 2045 ( 6.3393) is greater than 3.0 degrees C

150 14 73 2315 Air temp difference from 14 ( 73) 2315 (9.3351)

to 14 ( 73) 2330 ( 12.527) is greater than 3.0 degrees C

150 14 73 2345 Air temp difference from 14 ( 73) 2345 (11.658)

to 14 ( 73) 2400 ( 5.6668) is greater than 3.0 degrees C

150 15 74 45 Air temp difference from 15 ( 74) 45 ( 4.8655)

to 15 ( 74) 100 ( 14.37) is greater than 3.0 degrees C

150 15 74 100 Air temp difference from 15 ( 74) 100 ( 14.37)

to 15 ( 74) 115 ( 17.428) is greater than 3.0 degrees C

150 15 74 1700 Air temp difference from 15 ( 74) 1700 (13.949)

to 15 ( 74) 1715 ( 9.3675) is greater than 3.0 degrees C

150 29 88 930 Air temp difference from 29 ( 88) 930 ( 12.625)

to 29 ( 88) 945 ( 9.5681) is greater than 3.0 degrees C

150 29 88 945 Air temp difference from 29 ( 88) 945 ( 9.5681)

to 29 ( 88) 1000 ( 5.7143) is greater than 3.0 degrees C

150 15 74 45 Rel hum difference from 15 ( 74) 45 ( 86.673) to

15 ( 74) 100 ( 54.968) is greater than 25%

150 21 80 1215 Rel hum difference from 21 ( 80) 1215 ( 97.302)

to 21 ( 80) 1230 ( 71.565) is greater than 25%

150 21 80 1530 Rel hum difference from 21 ( 80) 1530 ( 55.999)

to 21 ( 80) 1545 ( 94.306) is greater than 25%

150 21 80 1545 Rel hum difference from 21 ( 80) 1545 ( 94.306)

to 21 ( 80) 1600 ( 67.372) is greater than 25%

150 21 80 1615 Rel hum difference from 21 ( 80) 1615 ( 58.529)

to 21 ( 80) 1630 ( 86.464) is greater than 25%

150 21 80 1745 Rel hum difference from 21 ( 80) 1745 ( 100) to

21 ( 80) 1800 ( 65.846) is greater than 25%

102 12 71 2000 Wind speed is less than 0.5 m/s from 12 ( 71)

2000 to 13 ( 72) 900

The following data appears to be correct and was flagged by the WDMP:

101 16 75 1100 Air temp average in 1 hour data (-.69541) is less

than 15 minute minimum (-.62727) by at least 10%

101 16 75 1900 Air temp average in 1 hour data (-.0148) is less

than 15 minute minimum ( .03527) by at least 10%

April 2002:

The following data appear to be correct:

Array Date Day Time Error Message

150 2 92 1215 Air temp difference from 2 ( 92) 1215 ( 15.083)

to 2 ( 92) 1230 ( 7.907) is greater than 3.0 degrees C

150 2 92 1315 Air temp difference from 2 ( 92) 1315 ( 12.359)

to 2 ( 92) 1330 ( 15.947) is greater than 3.0 degrees C

150 2 92 1430 Air temp difference from 2 ( 92) 1430 ( 15.214)

to 2 ( 92) 1445 ( 10.564) is greater than 3.0 degrees C

150 2 92 1930 Air temp difference from 2 ( 92) 1930 ( 10.233)

to 2 ( 92) 1945 ( 6.1794) is greater than 3.0 degrees C

150 11 101 1130 Air temp difference from 11 ( 101) 1130 ( 23.281)

to 11 ( 101) 1145 ( 15.312) is greater than 3.0 degrees C

150 11 101 1630 Air temp difference from 11 ( 101) 1630 ( 15.33)

to 11 ( 101) 1645 ( 18.519) is greater than 3.0 degrees C

150 11 101 1745 Air temp difference from 11 ( 101) 1745 ( 16.327)

to 11 ( 101) 1800 ( 20.179) is greater than 3.0 degrees C

150 13 103 730 Air temp difference from 13 ( 103) 730 ( 12.89)

to 13 ( 103) 745 ( 8.9701) is greater than 3.0 degrees C

150 19 109 1200 Air temp difference from 19 ( 109) 1200 ( 29.776)

to 19 ( 109) 1215 ( 26.589) is greater than 3.0 degrees C

150 19 109 1230 Air temp difference from 19 ( 109) 1230 ( 24.664)

to 19 ( 109) 1245 ( 20.282) is greater than 3.0 degrees C

150 19 109 1345 Air temp difference from 19 ( 109) 1345 ( 19.571)

to 19 ( 109) 1400 ( 22.626) is greater than 3.0 degrees C

150 25 115 15 Air temp difference from 25 ( 115) 15 ( 16.936)

to 25 ( 115) 30 ( 10.429) is greater than 3.0 degrees C

150 12 102 445 Rel hum difference from 12 ( 102) 445 ( 37.274)

to 12 ( 102) 500 ( 72.291) is greater than 25%

150 27 117 1100 Rel hum difference from 27 ( 117) 1100 ( 36.412)

to 27 ( 117) 1115 ( 66.777) is greater than 25%

The following data was deleted due to malfunctioning temp/rhum sensor: 15 minute

temperature from 4/13 2015 through 4/14 945, 15 minute relative humidity from

4/14 345 through 1045 and daily minimum temperature and relative humidity data

on 4/14.

May 2002:

The following data appear to be correct:

Array Date Day Time Error Message

150 1 121 115 Air temp difference from 1 ( 121) 115 ( 3.2846)

to 1 ( 121) 130 ( 6.4096) is greater than 3.0 degrees C

150 7 127 1045 Air temp difference from 7 ( 127) 1045 ( 19.714)

to 7 ( 127) 1100 ( 15.995) is greater than 3.0 degrees C

150 7 127 1330 Air temp difference from 7 ( 127) 1330 ( 15.264)

to 7 ( 127) 1345 ( 10.814) is greater than 3.0 degrees C

150 9 129 230 Air temp difference from 9 ( 129) 230 ( 16.95)

to 9 ( 129) 245 ( 20.866) is greater than 3.0 degrees C

150 9 129 245 Air temp difference from 9 ( 129) 245 ( 20.866)

to 9 ( 129) 300 ( 17.011) is greater than 3.0 degrees C

150 11 131 515 Air temp difference from 11 ( 131) 515 ( 6.0771)

to 11 ( 131) 530 ( 9.2021) is greater than 3.0 degrees C

150 12 132 2315 Air temp difference from 12 ( 132) 2315 ( 16.725)

to 12 ( 132) 2330 ( 11.411) is greater than 3.0 degrees C

150 14 134 1430 Air temp difference from 14 ( 134) 1430 ( 16.128)

to 14 ( 134) 1445 ( 11.943) is greater than 3.0 degrees C

150 16 136 2245 Air temp difference from 16 ( 136) 2245 ( 14.352)

to 16 ( 136) 2300 ( 9.5681) is greater than 3.0 degrees C

150 24 144 1115 Air temp difference from 24 ( 144) 1115 ( 16.924)

to 24 ( 144) 1130 ( 13.471) is greater than 3.0 degrees C

150 25 145 1630 Air temp difference from 25 ( 145) 1630 ( 24.608)

to 25 ( 145) 1645 ( 17.105) is greater than 3.0 degrees C

150 28 148 1500 Air temp difference from 28 ( 148) 1500 ( 24.874)

to 28 ( 148) 1515 ( 16.574) is greater than 3.0 degrees C

150 30 150 1545 Air temp difference from 30 ( 150) 1545 ( 27.784)

to 30 ( 150) 1600 ( 24.266) is greater than 3.0 degrees C

150 30 150 1600 Air temp difference from 30 ( 150) 1600 ( 24.266)

to 30 ( 150) 1615 ( 20.083) is greater than 3.0 degrees C

150 1 121 1245 Rel hum difference from 1 ( 121) 1245 ( 30.156)

to 1 ( 121) 1300 ( 56.526) is greater than 25%

150 4 124 930 Rel hum difference from 4 ( 124) 930 ( 36.478)

to 4 ( 124) 945 ( 71.495) is greater than 25%

150 11 131 515 Rel hum difference from 11 ( 131) 515 ( 100)

to 11 ( 131) 530 ( 68.683) is greater than 25%

150 25 145 1630 Rel hum difference from 25 ( 145) 1630 ( 53.652)

to 25 ( 145) 1645 ( 78.951) is greater than 25%

150 28 148 515 Rel hum difference from 28 ( 148) 515 ( 99.07)

to 28 ( 148) 530 ( 73.289) is greater than 25%

150 28 148 1500 Rel hum difference from 28 ( 148) 1500 ( 63.413)

to 28 ( 148) 1515 ( 91.966) is greater than 25%

150 30 150 1600 Rel hum difference from 30 ( 150) 1600 ( 65.527)

to 30 ( 150) 1615 ( 94.539) is greater than 25%

June 2002

The following data appear to be correct:

Array Date Day Time Error Message

150 4 155 830 Air temp difference from 4 ( 155) 830 ( 27) to 4

( 155) 845 ( 21.089) is greater than 3.0 degrees C

150 4 155 1530 Air temp difference from 4 ( 155) 1530 (24.097)

to 4 ( 155) 1545 ( 20.044) is greater than 3.0 degrees C

150 4 155 2030 Air temp difference from 4 ( 155) 2030 (23.434)

to 4 ( 155) 2045 ( 20.312) is greater than 3.0 degrees C

150 4 155 2300 Air temp difference from 4 ( 155) 2300 ( 17.39)

to 4 ( 155) 2315 ( 21.176) is greater than 3.0 degrees C

150 5 156 1315 Air temp difference from 5 ( 156) 1315 (25.271)

to 5 ( 156) 1330 ( 21.816) is greater than 3.0 degrees C

150 5 156 1700 Air temp difference from 5 ( 156) 1700 (20.312)

to 5 ( 156) 1715 ( 15.596) is greater than 3.0 degrees C

150 10 161 1230 Air temp difference from 10 ( 161) 1230 ( 31.822)

to 10 ( 161) 1245 ( 27.906) is greater than 3.0 degrees C

150 21 172 2345 Air temp difference from 21 ( 172) 2345 (9.5543)

to 21 ( 172) 2400 ( 14.735) is greater than 3.0 degrees C

150 21 172 2400 Air temp difference from 21 ( 172) 2400 (14.735)

to 22 ( 173) 15 ( 8.0927) is greater than 3.0 degrees C

150 22 173 15 Air temp difference from 22 ( 173) 15 ( 8.0927)

to 22 ( 173) 30 ( 14.801) is greater than 3.0 degrees C

150 22 173 215 Air temp difference from 22 ( 173) 215 (19.131)

to 22 ( 173) 230 ( 11.82) is greater than 3.0 degrees C

150 22 173 300 Air temp difference from 22 ( 173) 300 (11.423)

to 22 ( 173) 315 ( 7.368) is greater than 3.0 degrees C

150 22 173 315 Air temp difference from 22 ( 173) 315 ( 7.368)

to 22 ( 173) 330 ( 11.951) is greater than 3.0 degrees C

150 22 173 400 Air temp difference from 22 ( 173) 400 (11.224)

to 22 ( 173) 415 ( 7.8337) is greater than 3.0 degrees C

150 22 173 415 Air temp difference from 22 ( 173) 415 (7.8337)

to 22 ( 173) 430 ( 11.749) is greater than 3.0 degrees C

150 9 160 900 Rel hum difference from 9 ( 160) 900 ( 45.286)

to 9 ( 160) 915 ( 70.717) is greater than 25%

102 9 160 1900 Wind speed is less than 0.5 m/s from 9 ( 160)

1900 to 10 ( 161) 800

July 2002:

The following data appear to be correct:

Array Date Day Time Error Message

150 6 187 415 Air temp difference from 6 ( 187) 415 ( 16.08)

to 6 ( 187) 430 ( 19.402) is greater than 3.0 degrees C

150 22 203 1230 Air temp difference from 22 ( 203) 1230 (34.149)

to 22 ( 203) 1245 ( 30.097) is greater than 3.0 degrees C

150 23 204 515 Air temp difference from 23 ( 204) 515 (14.733)

to 23 ( 204) 530 ( 19.316) is greater than 3.0 degrees C

150 26 207 1200 Air temp difference from 26 ( 207) 1200 (28.443)

to 26 ( 207) 1215 ( 24.533) is greater than 3.0 degrees C

150 27 208 945 Air temp difference from 27 ( 208) 945 (25.538)

to 27 ( 208) 1000 ( 21.819) is greater than 3.0 degrees C

150 29 210 1630 Air temp difference from 29 ( 210) 1630 (28.319)

to 29 ( 210) 1645 ( 22.348) is greater than 3.0 degrees C

150 30 211 130 Air temp difference from 30 ( 211) 130 (13.072)

to 30 ( 211) 145 ( 16.592) is greater than 3.0 degrees C

150 30 211 215 Air temp difference from 30 ( 211) 215 (15.995)

to 30 ( 211) 230 ( 12.541) is greater than 3.0 degrees C

150 23 204 515 Rel hum difference from 23 ( 204) 515 ( 100) to

23 ( 204) 530 ( 74.925) is greater than 25%

150 26 207 1200 Rel hum difference from 26 ( 207) 1200 (63.863)

to 26 ( 207) 1215 ( 89.496) is greater than 25%

150 29 210 1630 Rel hum difference from 29 ( 210) 1630 (70.244)

to 29 ( 210) 1645 ( 100) is greater than 25%

August 2002:

The following data appears to be correct:

Array Date Day Time Error Message

150 14 226 1330 Air temp difference from 14 ( 226) 1330 ( 29.767) to

14 ( 226) 1345 ( 24.924) is greater than 3.0 degrees C

150 14 226 1345 Air temp difference from 14 ( 226) 1345 ( 24.924) to

14 ( 226) 1400 ( 20.884) is greater than 3.0 degrees C

150 16 228 1500 Air temp difference from 16 ( 228) 1500 ( 31.03) to

16 ( 228) 1515 ( 27.446) is greater than 3.0 degrees C

150 22 234 1400 Air temp difference from 22 ( 234) 1400 ( 31.095) to

22 ( 234) 1415 ( 24.388) is greater than 3.0 degrees C

150 24 236 1945 Air temp difference from 24 ( 236) 1945 ( 16.327) to

24 ( 236) 2000 ( 19.449) is greater than 3.0 degrees C

150 14 226 1345 Rel hum difference from 14 ( 226) 1345 ( 74.019) to

14 ( 226) 1400 ( 100) is greater than 25%

150 31 243 1145 Rel hum difference from 31 ( 243) 1145 ( 44.157) to

31 ( 243) 1200 ( 69.19) is greater than 25%

151 14 226 1400 Precip difference from 14 ( 226) 1400 ( 7.112) to

14 ( 226) 1415 ( .508) is greater than 5 mm

151 22 234 1430 Precip difference from 22 ( 234) 1430 ( 3.556) to

22 ( 234) 1445 ( 11.684) is greater than 5 mm

151 23 235 1730 Precip difference from 23 ( 235) 1730 ( .254) to

23 ( 235) 1745 ( 5.588) is greater than 5 mm

102 8 220 1900 Wind speed is less than 0.5 m/s from 8 ( 220) 1900

to 9 ( 221) 700

102 25 237 1800 Wind speed is less than 0.5 m/s from 25 ( 237) 1800

to 26 ( 238) 700

102 26 238 1800 Wind speed is less than 0.5 m/s from 26 ( 238) 1800

to 27 ( 239) 700

The following data was deleted due to malfunctioning temp/rhum sensor:

101 22 234 2200 Technician changed temp in 101 Array data from 22 ( 234)

2200

to 23 ( 235) 1100

150 22 234 1400 Technician changed temp in 150 Array data from 22 ( 234) 1745

to 23 ( 235) 0915

150 22 234 1400 Technician changed temp in 150 Array data from 23 ( 235) 1815

to 24 ( 236) 0900

150 25 237 545 Technician changed temp in 150 Array data from 25 ( 237) 545

to 25 ( 237) 700

150 25 237 1745 Technician changed temp in 150 Array data from 25 ( 237) 2100

to 26 ( 238) 745

150 26 238 1815 Technician changed temp in 150 Array data from 27 ( 239) 0200

to 630

150 29 241 1915 Technician changed temp in 150 Array data from 29 ( 241) 2300

to 30 ( 242) 715

150 22 234 1400 Technician changed rhum in 150 Array data from 22 ( 234) 1400

to 24 ( 236) 1015

150 25 237 545 Technician changed rhum in 150 Array data from 25 ( 237) 545

to 25 ( 237) 715

150 25 237 1745 Technician changed rhum in 150 Array data from 25 ( 237) 1745

to 26 ( 238) 745

150 26 238 1815 Technician changed rhum in 150 Array data from 26 ( 238) 1815

to 27 ( 239) 630

150 29 241 1915 Technician changed rhum in 150 Array data from 29 ( 241) 1915

to 30 ( 242) 715

241 23 235 2400 Technician changed temp in 241 Array from 23 ( 235)

2400

244 22 234 2400 Technician changed temp and rhum in 244 Array data from

22 ( 234) 2400 to 24 ( 236) 2400

244 26 238 2400 Technician changed temp and rhum in 244 Array data from

26 ( 238) 2400 to 26 ( 238) 2400

244 30 242 2400 Technician changed temp and rhum in 244 Array data from

30 ( 242) 2400 to 30 ( 242) 2400

September 2002:

The following data appears to be correct:

Array Date Day Time Error Message

150 2 245 1315 Air temp difference from 2 ( 245) 1315 ( 29.897)

to 2 ( 245) 1330 ( 24.188) is greater than 3.0 degrees C

150 2 245 1330 Air temp difference from 2 ( 245) 1330 ( 24.188)

to 2 ( 245) 1345 ( 20.611) is greater than 3.0 degrees C

150 3 246 1900 Air temp difference from 3 ( 246) 1900 ( 20.445)

to 3 ( 246) 1915 ( 23.833) is greater than 3.0 degrees C

150 4 247 2100 Air temp difference from 4 ( 247) 2100 ( 15.947)

to 4 ( 247) 2115 ( 21.927) is greater than 3.0 degrees C

150 5 248 45 Air temp difference from 5 ( 248) 45 ( 12.558)

to 5 ( 248) 100 ( 15.681) is greater than 3.0 degrees C

150 8 251 630 Air temp difference from 8 ( 251) 630 ( 15.077)

to 8 ( 251) 645 ( 18.124) is greater than 3.0 degrees C

150 11 254 2145 Air temp difference from 11 ( 254) 2145 ( 19.785)

to 11 ( 254) 2200 ( 15.469) is greater than 3.0 degrees C

150 11 254 2400 Air temp difference from 11 ( 254) 2400 ( 12.492)

to 12 ( 255) 15 ( 16.811) is greater than 3.0 degrees C

150 14 257 645 Air temp difference from 14 ( 257) 645 ( 23.036)

to 14 ( 257) 700 ( 18.253) is greater than 3.0 degrees C

150 14 257 915 Air temp difference from 14 ( 257) 915 ( 20.511)

to 14 ( 257) 930 ( 23.567) is greater than 3.0 degrees C

150 14 257 1230 Air temp difference from 14 ( 257) 1230 ( 30.894)

to 14 ( 257) 1245 ( 27.441) is greater than 3.0 degrees C

150 14 257 1300 Air temp difference from 14 ( 257) 1300 ( 24.655)

to 14 ( 257) 1315 ( 21.611) is greater than 3.0 degrees C

150 16 259 1645 Air temp difference from 16 ( 259) 1645 ( 19.898)

to 16 ( 259) 1700 ( 16.652) is greater than 3.0 degrees C

150 19 262 2000 Air temp difference from 19 ( 262) 2000 ( 24.011)

to 19 ( 262) 2015 ( 20.76) is greater than 3.0 degrees C

150 20 263 1245 Air temp difference from 20 ( 263) 1245 ( 23.347)

to 20 ( 263) 1300 ( 19.695) is greater than 3.0 degrees C

150 2 245 1315 Rel hum difference from 2 ( 245) 1315 ( 49.253)

to 2 ( 245) 1330 ( 76.469) is greater than 25%

150 6 249 2300 Rel hum difference from 6 ( 249) 2300 ( 100) to

6 ( 249) 2315 ( 74.086) is greater than 25%

150 14 257 645 Rel hum difference from 14 ( 257) 645 ( 67.884)

to 14 ( 257) 700 ( 100) is greater than 25%

150 20 263 1830 Rel hum difference from 20 ( 263) 1830 ( 100)

to 20 ( 263) 1845 ( 68.814) is greater than 25%

150 20 263 1845 Rel hum difference from 20 ( 263) 1845 ( 68.814)

to 20 ( 263) 1900 ( 96.313) is greater than 25%

151 20 263 1245 Precip difference from 20 ( 263) 1245 ( .254) to

20 ( 263) 1300 ( 11.684) is greater than 5 mm

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

101 20 263 1900 Air temp average in 1 hour data ( 12.958) is

greater than 15 minute maximum ( 10.681) by at least 10%

The following data was deleted due to malfunctioning temp/rhum sensor: 15 minute

temperature from 9/20 1700 through 1945 and 9/27 from 515 through 1045, 15

minute

relative humidity from 9/20 at 1845, and daily minimum temperature and relative

humidity data on 9/4 and 9/20.

October 2002:

The following data appear to be correct:

Array Date Day Time Error Message

150 14 287 115 Air temp difference from 14 ( 287) 115 ( 7.5338)

to 14 ( 287) 130 ( 3.5478) is greater than 3.0 degrees C

150 20 293 2045 Air temp difference from 20 ( 293) 2045 ( 3.1516)

to 20 ( 293) 2100 ( 6.9415) is greater than 3.0 degrees C

150 21 294 730 Air temp difference from 21 ( 294) 730 ( 4.5479)

to 21 ( 294) 745 ( 8.0053) is greater than 3.0 degrees C

150 25 298 2330 Air temp difference from 25 ( 298) 2330 ( 1.2762)

to 25 ( 298) 2345 (-3.2436) is greater than 3.0 degrees C

150 25 298 2400 Air temp difference from 25 ( 298) 2400 (-3.7754)

to 26 ( 299) 15 ( .07975) is greater than 3.0 degrees C

150 26 299 30 Air temp difference from 26 ( 299) 30 ( .41209)

to 26 ( 299) 45 (-3.2436) is greater than 3.0 degrees C

150 26 299 45 Air temp difference from 26 ( 299) 45 (-3.2436)

to 26 ( 299) 100 ( .14622) is greater than 3.0 degrees C

150 26 299 115 Air temp difference from 26 ( 299) 115 (-.18612)

to 26 ( 299) 130 (-4.8388) is greater than 3.0 degrees C

150 26 299 130 Air temp difference from 26 ( 299) 130 (-4.8388)

to 26 ( 299) 145 (-.38552) is greater than 3.0 degrees C

150 27 300 2300 Air temp difference from 27 ( 300) 2300 ( .29248)

to 27 ( 300) 2315 ( 3.617) is greater than 3.0 degrees C

150 3 276 2245 Rel hum difference from 3 ( 276) 2245 ( 100) to

3 ( 276) 2300 ( 60.066) is greater than 25%

150 3 276 2300 Rel hum difference from 3 ( 276) 2300 ( 60.066)

to 3 ( 276) 2315 ( 100) is greater than 25%

150 4 277 300 Rel hum difference from 4 ( 277) 300 ( 100) to

4 ( 277) 315 ( 65.448) is greater than 25%

150 4 277 315 Rel hum difference from 4 ( 277) 315 ( 65.448)

to 4 ( 277) 330 ( 100) is greater than 25%

150 14 287 115 Rel hum difference from 14 ( 287) 115 ( 53.584)

to 14 ( 287) 130 ( 78.652) is greater than 25%

150 27 300 2300 Rel hum difference from 27 ( 300) 2300 ( 100)

to 27 ( 300) 2315 ( 70.279) is greater than 25%

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

101 3 276 2400 Relative humidity average in 1 hour data ( 77.563) is

less than 15 minute minimum ( 100) by at least 10%

101 25 298 2300 Air temp average in 1 hour data ( .47772) is less

than 15 minute minimum ( 1.0768) by at least 10%

101 26 299 300 Air temp average in 1 hour data (-1.7584) is less

than 15 minute minimum (-1.3825) by at least 10%

101 26 299 400 Air temp average in 1 hour data (-1.9204) is less

than 15 minute minimum (-1.5819) by at least 10%

101 26 299 500 Air temp average in 1 hour data (-1.4849) is less

than 15 minute minimum (-1.0502) by at least 10%

101 26 299 600 Air temp average in 1 hour data (-1.4061) is less

than 15 minute minimum (-.58492) by at least 10%

The following data was deleted due to malfunctioning temp/rhum sensor: 15 minute

temperature from 10/3 2115 through 10/4 515, and daily minimum relative humidity

data on 10/3 and 10/4.

November 2002:

The following data appears to be correct:

Array Date Day Time Error Message

150 10 314 1645 Air temp difference from 10 ( 314) 1645 ( 19.847)

to 10 ( 314) 1700 ( 15.198) is greater than 3.0 degrees C

151 10 314 1700 Precip difference from 10 ( 314) 1700 ( 10.668)

to 10 ( 314) 1715 ( 1.016) is greater than 5 mm

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

101 26 330 1700 Air temp average in 1 hour data (-.27445) is greater

than 15 minute maximum (-.35938) by at least 10%

The following data was deleted due to malfunctioning temp/rhum sensor: 15 minute

temperature and relative humidity on 11/2 0730, and daily minimum temperature

and relative humidity data on 11/2.

December 2002:

The following data appears to be correct:

Array Date Day Time Error Message

102 10 344 1600 Wind speed is less than 0.5 m/s from 10 ( 344) 1600 to

11 ( 345) 700

The following data appears to be correct and was flagged by the WDMP:

Array Date Day Time Error Message

101 7 341 2300 Air temp average in 1 hour data (-.20749) is less

than 15 minute minimum (-.15964) by at least 10%

101 8 342 100 Air temp average in 1 hour data (-.12463) is less

than 15 minute minimum (-.09313) by at least 10%

101 8 342 300 Air temp average in 1 hour data (-.68222) is

greater than 15 minute maximum (-.62522) by at least 10%

101 24 358 2000 Air temp average in 1 hour data (-.61479) is less

than 15 minute minimum (-.55871) by at least 10%

101 29 363 2000 Air temp average in 1 hour data (-.17775) is less

than 15 minute minimum (-.15964) by at least 10%

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

January 2002

there appears to be no missing data

February 2002

there appears to be no missing data

March 2002

there appears to be no missing data

April 2002

there appears to be no missing data

May 2002

there appears to be no missing data

June 2002

there appears to be no missing data

July 2002

there appears to be no missing data

August 2002:

Array Date Day Time Error Message

150 29 241 300 Missing 150 Array data (15 minute data) from

29 ( 241) 300 to 31 ( 243) 2400

101 29 241 300 Missing 101 Array data (Hourly Averages) from

29 ( 241) 300 to 31 ( 243) 2400

102 29 241 300 Missing 102 Array data (Hourly Average Wind Parameters)

from 29 ( 241) 300 to 31 ( 243) 2300

241 29 241 2400 Missing 241 data (Daily Averages) from 29 ( 241) 2400

to 31 ( 242) 2400

242 29 241 2400 Missing 242 data (Daily Average Wind Parameters) from

29 ( 241) 2400 to 31 ( 242) 2400

243 29 241 2400 Missing 243 data (Daily Max/Time Values) from

29 ( 241) 2400 to 31 ( 242) 2400

244 29 241 2400 Missing 244 data (Daily Min/Time Values) from

29 ( 241) 2400 to 31 ( 242) 2400

September 2002

there appears to be no missing data

October 2002

there appears to be no missing data

November 2002:

there appears to be no missing data

December 2002

there appears to be no missing data

13. 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.

In June 2009, in order to repopulate data tables, the Centralized Data Management Office removed all -55555 from SWMP weather data files and replaced them with blanks.

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.

Please note that the temperature/relative humidity probe suffered infrequent

intermittent failure from May 2002 through November 2, 2002 when the HMP45 probe

was replaced. During these intermittent failures, the 15 minute (150) data was

affected as well as the daily minimum (244) data, however the hourly averages

(101), daily averages (241) and the daily maximums (243) appeared to be

unaffected unless otherwise noted. See Section 11 for more details.

Rain Amounts (mm)

January:

6 7.366

12 2.540

14 1.270

23 1.270

24 4.318

29 11.684

30 10.668

31 34.036

"Monthly Total" 73.2

February:

1 9.398

10 9.144

16 .254

19 1.778

20 5.080

21 1.016

26 5.588

27 .508

"Monthly Total" 32.8

March:

2 12.700

3 .254

7 1.016

9 7.112

12 .254

15 7.112

20 4.826

21 .762

24 7.366

25 3.302

26 18.796

27 3.556

29 15.748

31 2.286

"Monthly Total" 85.1

April:

2 12.446

5 2.794

8 13.970

9 3.556

12 14.732

13 6.350

14 7.620

19 2.032

20 6.604

21 2.286

22 3.048

23 .508

25 2.286

27 4.572

28 1.016

"Monthly Total" 83.8

May:

1 7.620

2 7.620

6 4.064

7 .508

8 4.826

9 2.032

11 1.524

12 14.224

13 28.702

14 .254

16 13.208

17 .762

18 2.794

20 2.540

24 1.270

25 12.446

28 4.572

29 4.826

30 2.540

"Monthly Total" 116.3

June:

3 20.574

4 .762

5 10.414

12 8.128

13 1.778

15 1.270

17 4.064

18 .254

21 5.334

27 1.524

28 2.032

"Monthly Total" 56.1

July:

1 .508

9 2.032

22 1.270

26 .254

27 1.524

28 3.556

29 4.064

"Monthly Total" 13.2

August:

1 3.556

5 3.302

6 .254

13 .254

20 1.016

22 .508

23 .254

24 2.540

25 .254

"Monthly Total" 11.9

September:

2 6.604

3 .254

14 18.034

15 2.286

18 2.032

19 2.540

20 29.718

26 .762

27 48.514

"Monthly Total" 110.7

October:

4 7.366

13 1.016

18 3.048

19 7.874

23 2.794

25 21.336

26 .254

29 .254

"Monthly Total" 43.9

November:

5 6.604

10 34.798

15 5.588

16 5.334

19 2.540

21 8.382

22 24.384

26 5.334

30 1.016

"Monthly Total" 94.0

December:

2 1.524

11 2.286

13 2.794

14 1.016

18 .762

19 18.288

22 .254

24 1.778

25 4.064

30 7.366

31 10.668

"Monthly Total" 50.8