Hudson River (HUD) NERR Meteorological Metadata

January 2002 - December 2002

Latest Update: **February 5, 2023**

I. Data Set & Research Descriptors

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2. Entry verification:

Person responsible for data verification: Erik Bedan, Research Assistant

a) Data Input Procedures:

The 15-minute, 1-hour average, and 24-hour data were downloaded from each

instrument on the weather station to a Campbell Scientific CR10X datalogger.

The CDMO Datalogger Program (hud30.csi) was loaded into the CR10X, which

controls the sensors and the data collection schedule (see 2b of the Entry

Verification section for the data collection schedule). For data storage, the

CR10X stored the data, via cable, on a Campbell Scientific SM 192 storage

module. The storage module was manually retrieved at the end of every month.

Using the PC208W software supplied by Campbell Scientific, the data were

uploaded from the storage module and stored on computer. All raw data files

were archived at the CDMO and at the reserve on ditto tapes, and CD-ROM.

Anomalous or missing data were either deleted or identified in sections 11 & 12.

After the data upload, the CDMO Weather Data Management Program

(WDMP) was used to convert the data into an Access database. This program was

developed in Visual Basic to interface with the NERRS data collection schedule

(see 2b of the Entry Verification section for the data collection schedule).

The WDMP will automatically input and convert the monthly raw data file into an

Access Database. There were three main tasks completed by the WDMP. First, it

converted the comma delimited monthly raw data file into an Access Database.

Secondly, it checked the data against a predetermined set of error criteria (see

Part C of this section). Finally, it produced error and summary reports. Any

anomalous data were investigated and were noted below in Anomalous Data section.

Any data corrections that were performed were noted in the Data Correction

section below. Most common errors from monthly reports were wind speeds below

the 0.5m/s criteria.

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

- 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 study is to monitor the meteorological conditions at

the Tivoli Bays component site of the Hudson River National Estuarine Research

Reserve. Measurements are taken all year long at one location in accordance

with section 2b of the Entry Verification section. A water quality-monitoring

program has been ongoing for ten years at this component site, and the

meteorological data will help provide ancillary data to that program. In turn,

this will help us to better understand the relationships between the atmospheric

and aquatic environments at this site.

4. Research methods:

For data collection, the CR10X datalogger is programmed at intervals that

are in accordance with section 2b of the Entry Verification section. Data are

retrieved and stored from the datalogger via the Campbell Scientific storage

module at the end of each month. The data are analyzed using only the Weather

Data Management Program (WDMP). The program creates a database and error report

for each month of raw data. The error reports are used to aid in the QA/QC of

the data, along with the guidelines in section 2c. Any errors are reported and

corrected (if necessary) in sections 11 & 12. For routine maintenance,

sensors are investigated at least once a week to ensure there is no damage or

blockage to the sensors. According to Campbell Scientific, for proper data

collection, sensors are to be calibrated every two 2 years. After that time,

the sensors are removed from the tower, and shipped to their respective

manufacturer. The calibration methods are performed by the manufacturers for

proper and professional calibration. In order to avoid missing data, a second

set of sensors will be calibrated and available to be installed on the tower to

continue data collection.

5. Site location and character:

The Hudson River National Estuarine Research Reserve (HUDNERR) is a multi-

component site composed of approximately 5,000 acres of tidal wetland, open

water, and adjacent upland buffer habitat. The four component sites of the

Reserve are located on the Hudson River in New York State by river miles (RM)

proceeding north from the southern tip of Manhattan. These include: Stockport

Flats (RM 124)(42°02'30"N 73°46'00"W), Columbia County; Tivoli Bays (RM

98)(42°02'15"N 73°55'10"W), Dutchess County; and Iona Island (RM 45)(41°18'15"N

73°58'45"W) and Piermont Marsh (RM 24)(41°02'30"N 73°54'15"W),Rockland County.

These four components are located along 100 river miles of the Hudson River and

are representative of the diverse plant and animal communities that occupy the

salinity gradient within the Hudson estuary. Development within the watersheds

of Hudson River NERR component sites ranges from predominantly urban/suburban to

forested/agricultural.

The weather station (FS) is located at the Tivoli Bays component site in

Annandale, NY (42°01'05.46"N 73°55'01.13"W). A 30 foot, aluminum tower is used

to elevate some of the weather monitoring equipment. The tower is on the deck of

the office building, on the west side, 9 feet off the ground. The wind

anemometer, wind speed, and light sensors are all located at the top of the

tower, 39 feet off the ground. Both the datalogger and barometric pressure

sensor are enclosed within a fiberglass case attached to the tower, 12 feet off

the ground. A heated rain gauge is next to the tower, attached to the building,

16 feet off the ground. The temperature/humidity sensor is next to the tower,

attached to the deck handrail, 12 feet off the ground. Although trees surround

the area, the tree line begins approximately 60 feet from the tower in most

directions. The trees are at similar heights to the tower, but the sensors are

not shaded at that location. The tower is approximately 1.2 miles Southeast of

the TS water quality monitoring station, 2.3 miles Southeast of the TN water

quality monitoring station, and 0.2 miles Northwest of the SK water quality

monitoring station.

6. Data collection period:

The first data were recorded on January 14, 2002 at 16:45 hours EST, and ended

on December 31, 2002 at 2400 hours EST.

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 were 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

nvestigators 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:

The Hudson River NERR water quality-monitoring program examines the

physical and chemical constituents of the tributary waters and the tidal waters

discharging into the HUDNERR marshes and marsh waters. Measurements include

seston, dissolved oxygen (DO), alkalinity, pH, temperature, salinity, and

conductivity. In addition, samples are analyzed for nutrient concentrations of

nitrate, phosphate, sulphate, and chloride.

Associated researchers with work at Tivoli Bays include: scientists from

the Institute of Ecosystem Studies, Millbrook, NY; Yale School of Forestry and

Environmental Studies, New Haven, CT; and Rensselaer Polytechnic Institute,

Troy, NY.

II. Physical Structure Descriptors

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

Sensors in use from July 2001-June 2002:

Li-Cor Quantum Sensor

Model # LI190SB

Stability: <±2% change over 1 yr

Operating Temperature: -40 to 65°C

Sensitivity: typically 5 µA per 1000µmoles s-1 m-2

Light spectrum wavelength: 400-700 nm

Date of last calibration: December 2000

Wind Sentry

Model # 03001

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

Date of last calibration: December 2000

Temperature and Relative Humidity

Model #: HMP35C

Operating Range: -35 to 50°C

Temperature Accuracy: ± 0.2 °C @ 20°C

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

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

Uncertainty of calibration: ±1.2% RH

Date of Last calibration: December 2000

Barometric Pressure Sensor

Model # CS105

Operating Range: 600 to 1060 mb

Operating Temperature: -40 to 60°C

Humidity: non-condensing

Accuracy: ±0.5 to 6.0 mb (+20 to 60°C)

Stability: ± 0.1 mb per year

Date of Last calibration: December 2000

Tipping Bucket Rain and Snow Gauge

Model #: 375-L

Operating Range: -20°C to 50°C; 0-100% RH

Sensitivity: 0.1mm

Accuracy: ±0.5% at <1.25/hr

Date of Last calibration: December 2000

The following sensors in use from July 2002-February 2003:

Li-Cor Quantum Sensor

Model # LI190SB

Stability: <±2% change over 1 yr

Operating Temperature: -40 to 65°C

Sensitivity: typically 5 mV per 1000 micromoles s-1 m-2

Light spectrum wavelength: 400-700 nm

Date of last calibration: May 2002

Wind Sentry

Model # 03001

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

Date of last calibration: May 2002

Temperature and Relative Humidity

Model #: HMP45C

Operating Range: -35°C to 50°C

Temperature Accuracy: ± 0.2 °C @ 20°C

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

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

Uncertainty of calibration: ±1.2% RH

Date of Last calibration: May 2002

Barometric Pressure Sensor

Model # CS105

Operating Range: 600-1060 mb

Operating Temperature: -40°C to 60°C

Humidity: non-condensing

Accuracy: ±0.5 to 6.0 mb (+20°C to 60°C)

Stability: ± 0.1 mb per year

Date of Last calibration: May 2002

Tipping Bucket Rain and Snow Gauge

Model #: 375-L

Operating Range: -20°C to 50°C; 0-100% RH

Sensitivity: 0.1mm

Accuracy: ±0.5% at <1.25/hr

Date of Last calibration: May 2002

10. Coded variable indicator and variable code definitions:

FS - Field Station at Tivoli Bays

11. Data anomalies:

**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

At this site, wintery weather requires us to utilize a heating tipping bucket

for precipitation data. The heater may not have been functioning this month,

precipitation data are suspect.

Array Day Julian Time Error

102 14 14 1700 Wind speed is less than 0.5 m/s from 14 ( 14)

1700 to 15 ( 15) 800

102 19 19 1700 Wind speed is less than 0.5 m/s from 19 ( 19)

1700 to 20 ( 20) 900

102 30 30 2300 Wind speed is less than 0.5 m/s from 30 ( 30)

2300 to 31 ( 31) 2400

February 2002

The following error occured because the "1 hour data" is averaged from 5-second

readings taken during that hour while the "15 minute data" (in this case the 15

minute maximum) is not averaged, and only recorded at 15-minute intervals. The

data were left in.

Array Julian Day Time Error

101 44 13 1500 Air temp average in 1 hour data ( .02) is greater than

15 minute maximum (-.00712)

Array Day Julian Time Error

102 1 32 100 Wind speed is less than 0.5 m/s from 1 ( 32)

100 to 1 ( 32) 1300

102 6 37 2200 Wind speed is less than 0.5 m/s from 6 ( 37)

2200 to 7 ( 38) 1000

102 11 42 1900 Wind speed is less than 0.5 m/s from 11 ( 42)

1900 to 12 ( 43) 800

102 16 47 1600 Wind speed is less than 0.5 m/s from 16 ( 47)

1600 to 17 ( 48) 700

March 2002

Data points were reviewed before and after the following errors. There was a

notable change, but the data were consistent. It was most likely an event. The

data were left in.

Array Julian Day Time Error

150 62 3 1800 Air temp difference from 3 ( 62) 1800 ( 13.667) to 3 (

62) 1815 ( 10.559) is greater than 3.0 degrees C

150 68 9 1315 Air temp difference from 9 ( 68) 1315 ( 14.308) to 9 (

68) 1330 ( 17.684) is greater than 3.0 degrees C

150 80 21 1915 Air temp difference from 21 ( 80) 1915 ( 9.735) to 21

( 80) 1930 ( 5.9559) is greater than 3.0 degrees C

Data points were reviewed before and after the following error. There was a

notable change, but the data were consistent. It was most likely an event. The

data were left in.

Array Julian Day Time Error

150 62 3 2030 Rel hum difference from 3 ( 62) 2030 ( 46.337) to 3 (

62) 2045 ( 73.16) is greater than 25%

Array Day Julian Time Error

102 12 71 1800 Wind speed is less than 0.5 m/s from 12 ( 71) 1800

to 13 ( 72) 1000

102 13 72 1600 Wind speed is less than 0.5 m/s from 13 ( 72) 1600

to 14 ( 73) 900

102 14 73 1800 Wind speed is less than 0.5 m/s from 14 ( 73) 1800

to 15 ( 74) 600

102 17 76 1700 Wind speed is less than 0.5 m/s from 17 ( 76) 1700

to 18 ( 77) 1500

102 18 77 1700 Wind speed is less than 0.5 m/s from 18 ( 77) 1700

to 19 ( 78) 800

102 19 78 1700 Wind speed is less than 0.5 m/s from 19 ( 78) 1700

to 21 ( 80) 1100

April 2002

Data points were reviewed before and after the following errors. There was a

notable change, but the data were consistent. It was most likely an event. The

data were left in.

Array Julian Day Time Error

150 107 17 1015 Air temp difference from 17 ( 107) 1015 ( 26.043) to

17 ( 107) 1030 ( 29.052) is greater than 3.0 degrees C

150 109 19 1200 Air temp difference from 19 ( 109) 1200 ( 29.947) to

19 ( 109) 1215 ( 26.558) is greater than 3.0 degrees C

150 109 19 1215 Air temp difference from 19 ( 109) 1215 ( 26.558) to

19 ( 109) 1230 ( 19.046) is greater than 3.0 degrees C

Data points were reviewed before and after the following error. There was a

notable change, and some fluctuation in temperature data occurred. Ultimately,

the cause is unknown, and the data were left in.

Array Julian Day Time Error

150 107 17 1430 Air temp difference from 17 ( 107) 1430 ( 33.519) to

17 ( 107) 1445 ( 36.609) is greater than 3.0 degrees C

Data points were reviewed before and after the following error. There was a

notable change, but the data were consistent. It was most likely an event. The

data were left in.

Array Julian Day Time Error

150 109 19 1215 Rel hum difference from 19 ( 109) 1215 ( 56.917) to 19

( 109) 1230 ( 95.75) is greater than 25%

Array Day Julian Time Error

102 10 100 1900 Wind speed is less than 0.5 m/s from 10 ( 100) 1900

to 11 ( 101) 700

102 15 105 1800 Wind speed is less than 0.5 m/s from 15 ( 105) 1800

to 16 ( 106) 800

102 16 106 1900 Wind speed is less than 0.5 m/s from 16 ( 106) 1900

to 17 ( 107) 800

102 18 108 1800 Wind speed is less than 0.5 m/s from 18 ( 108) 1800

to 19 ( 109) 700

102 21 111 1900 Wind speed is less than 0.5 m/s from 21 ( 111) 1900

to 22 ( 112) 2000

102 25 115 1900 Wind speed is less than 0.5 m/s from 25 ( 115) 1900

to 26 ( 116) 700

102 27 117 1700 Wind speed is less than 0.5 m/s from 27 ( 117) 1700

to 29 ( 119) 800

May 2002

Data points were reviewed before and after the following errors. There was a

notable change, but the data were consistent. It was most likely an event. The

data were left in.

Array Julian Day Time Error

150 151 31 1315 Air temp difference from 31 ( 151) 1315 ( 24.429) to

31 ( 151) 1330 ( 20.242) is greater than 3.0 degrees C

150 151 31 1715 Air temp difference from 31 ( 151) 1715 ( 20.772) to

31 ( 151) 1730 ( 17.752) is greater than 3.0 degrees C

Data points were reviewed before and after the following errors. The cause is

unknown, and it was most likely an event. The data were left in.

Array Julian Day Time Error

150 141 21 1315 Rel hum difference from 21 ( 141) 1315 ( 58.12) to 21

( 141) 1330 ( 85.336) is greater than 25%

150 141 21 1330 Rel hum difference from 21 ( 141) 1330 ( 85.336) to 21

( 141) 1345 ( 60.198) is greater than 25%

150 141 21 1415 Rel hum difference from 21 ( 141) 1415 ( 51.014) to 21

( 141) 1430 ( 76.353) is greater than 25%

150 141 21 1445 Rel hum difference from 21 ( 141) 1445 ( 91.838) to 21

( 141) 1500 ( 64.019) is greater than 25%

Data points were reviewed before and after the following errors. There was a

notable change, and it was most likely an event. The data were left in.

Array Julian Day Time Error

151 122 2 1930 Precip difference from 31 ( 122) 1930 ( .508) to 31 (

122) 1945 ( 5.588) is greater than 5 mm

151 122 2 1945 Precip difference from 31 ( 122) 1945 ( 5.588) to 31 (

122) 2000 ( .508) is greater than 5 mm

Array Day Julian Time Error

102 1 121 1800 Wind speed is less than 0.5 m/s from 1 ( 121) 1800

to 2 ( 122) 900

102 4 124 1800 Wind speed is less than 0.5 m/s from 4 ( 124) 1800

to 5 ( 125) 800

102 5 125 1800 Wind speed is less than 0.5 m/s from 5 ( 125) 1800

to 6 ( 126) 700

102 8 128 1800 Wind speed is less than 0.5 m/s from 8 ( 128) 1800

to 9 ( 129) 900

102 11 131 1800 Wind speed is less than 0.5 m/s from 11 ( 131) 1800

to 13 ( 133) 2300

102 19 139 2000 Wind speed is less than 0.5 m/s from 19 ( 139) 2000

to 20 ( 140) 800

102 22 142 1900 Wind speed is less than 0.5 m/s from 22 ( 142) 1900

to 23 ( 143) 800

102 26 146 1800 Wind speed is less than 0.5 m/s from 26 ( 146) 1800

to 27 ( 147) 1100

102 27 147 1800 Wind speed is less than 0.5 m/s from 27 ( 147) 1800

to 28 ( 148) 1400

102 28 148 1600 Wind speed is less than 0.5 m/s from 28 ( 148) 1600

to 29 ( 149) 1100

The following hourly and daily data were deleted on May 3 due to loss of 5 second data

resulting from station maintenance from 1400-1430.

Array Day Julian Time Error

101 3 123 1500 Technician changed 101 Array data from 3 ( 123) 1500

102 3 123 1500 Technician changed 102 Array from 3 ( 123) 1500

241 3 123 2400 Technician changed 241 Array from 3 ( 123) 2400

242 3 123 2400 Technician changed 242 Array from 3 ( 123) 2400

243 3 123 2400 Technician changed 243 Array data from 3 ( 123) 2400

244 3 123 2400 Technician changed 244 Array data from 3 ( 123) 2400

Pressure sensor errors (-99999) were recorded on May 20 @ 1900 in array 150 and @ 2400

in array 244. Reason unknown.

June 2002

The station was not collecting data due to equipment maintenance on 06/03/02

from 800-1400. The following data were removed:

Array Day Julian Time Error

101 3 154 800 Technician changed 101 Array data from 3

( 154) 800 to 3 ( 154) 1300

102 3 154 800 Technician changed 102 Array from 3 (

154) 800 to 3 ( 154) 1300

241 3 154 2400 Technician changed 241 Array from 3 (

154) 2400 to 3 ( 154) 2400

242 3 154 2400 Technician changed 242 Array from 3 (

154) 2400 to 3 ( 154) 2400

243 3 154 2400 Technician changed 243 Array data from 3

( 154) 2400 to 3 ( 154) 2400

244 3 154 2400 Technician changed 244 Array data from 3

( 154) 2400 to 3 ( 154) 2400

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

Data points were reviewed before and after the following errors. Other

parameters changed along with the air temperature, it was most likely an event.

The data were left in.

Array Day Julian Time Error

150 22 173 1315 Air temp difference from 22 ( 173) 1315

( 28.418) to 22 ( 173) 1330 ( 25.071) is greater than 3.0 degrees C

150 23 174 1900 Air temp difference from 23 ( 174) 1900

( 28.496) to 23 ( 174) 1915 ( 25.283) is greater than 3.0 degrees C

150 26 177 1415 Air temp difference from 26 ( 177) 1415

( 31.8) to 26 ( 177) 1430 ( 22.773) is greater than 3.0 degrees C

The data were left in.

Array Day Julian Time Error

150 26 177 1415 Rel hum difference from 26 ( 177) 1415 (

59.822) to 26 ( 177) 1430 ( 91.751) is greater than 25%

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 06/03/02 1400 - 06/30/02 2400. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

150 3 154 1400 Technician changed 150 Array data at 3 (154) 1400

to 30 ( 181) 2400

101 3 154 1400 Technician changed 101 Array data at 3 ( 154) 1400

to 30 ( 181) 2400

241 3 154 2400 Technician changed 241 Array data at 3 ( 154) 2400

to 30 ( 181) 2400

243 3 154 2400 Technician changed 243 Array data at 3 ( 154) 2400

to 30 ( 181) 2400

244 3 154 2400 Technician changed 244 Array data at 3 ( 154) 2400

to 30 ( 181) 2400

Array Day Julian Time Error

151 5 156 2145 Precip difference from 5 ( 156) 2145 ( 6.096)

to 5 ( 156) 2200 ( 1.016) is greater than 5 mm

151 26 177 1430 Precip difference from 26 ( 177) 1430 ( 5.588)

to 26 ( 177) 1445 ( .254) is greater than 5 mm

July 2002

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 07/01/02 0000 - 07/31/02 2400. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

101 1 182 100 Technician changed 101 Array data at 1 ( 182) 100

to 31 ( 212) 2400

150 1 182 15 Technician changed 150 Array data at 1 ( 182) 15

to 31 ( 212) 2400

241 1 182 2400 Technician changed 241 Array data at 1 ( 182) 2400

to 31 ( 212) 2400

243 1 182 2400 Technician changed 243 Array data at 1 ( 182) 2400

to 31 ( 212) 2400

244 1 182 2400 Technician changed 244 Array data at 1 ( 182) 2400

to 31 ( 212) 2400

Data points were reviewed before and after the following error. Other parameters

changed along with the air temperature, it was most likely an event. The data

were left in.

Array Day Julian Time Error

150 23 204 1300 Air temp difference from 23 ( 204) 1300

( 32.746) to 23 ( 204) 1315 ( 23.848)

Data points were reviewed before and after the following error. Other parameters

changed along with the relative humidity, it was most likely an event. The data

were left in.

Array Day Julian Time Error

150 23 204 1300 Rel hum difference from 23 ( 204) 1300 (

57.488) to 23 ( 204) 1315 ( 89.882) is greater than 25%

August 2002

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 08/01/02 0000 - 08/30/02 2400. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

101 1 213 100 Technician changed 101 Array data at 1 ( 213) 100

to 31 ( 243) 2400

150 1 213 15 Technician changed 150 Array data at 1 ( 213) 15

to 31 ( 243) 2400

241 1 213 2400 Technician changed 241 Array data at 1 ( 213) 2400

to 31 ( 243) 2400

243 1 213 2400 Technician changed 243 Array data at 1 ( 213) 2400

to 31 ( 243) 2400

244 1 213 2400 Technician changed 244 Array data at 1 ( 213) 2400

to 31 ( 243) 2400

Data points were reviewed before and after

the following errors. Many parameters exibited a sudden change while errors were

recorded, it was most likely an event. All the following the data were left in.

Array Day Julian Time Error

150 2 214 1715 Air temp difference from 2 ( 214) 1715 (

23.44) to 2 ( 214) 1730 ( 20.224) is greater than 3.0 degrees C

150 16 228 1400 Air temp difference from 16 ( 228) 1400

( 33.881) to 16 ( 228) 1415 ( 25.248) is greater than 3.0 degrees C

150 18 230 1530 Air temp difference from 18 ( 230) 1530

( 33.41) to 18 ( 230) 1545 ( 27.523) is greater than 3.0 degrees C

Array ID Calendar Date Julian Day Time Error Message

150 16 228 1400 Rel hum difference from 16 ( 228) 1400 (

44.636) to 16 ( 228) 1415 ( 84.588) is greater than 25%

150 18 230 1530 Rel hum difference from 18 ( 230) 1530 (

44.635) to 18 ( 230) 1545 ( 76.156) is greater than 25%

Array Day Julian Time Error

151 2 214 1715 Precip difference from 2 ( 214) 1715 (

.254) to 2 ( 214) 1730 ( 7.366) is greater than 5 mm

151 2 214 1730 Precip difference from 2 ( 214) 1730 (

7.366) to 2 ( 214) 1745 ( .254) is greater than 5 mm

September 2002

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 09/01/02 0000 - 09/30/02 2400. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

101 1 244 100 Technician changed 101 Array data at 1 ( 244) 100

to 30 ( 273) 2400

150 1 244 15 Technician changed 150 Array data at 1 ( 244) 15

to 30 ( 273) 2400

241 1 244 2400 Technician changed 241 Array data at 1 ( 244) 2400

to 30 ( 273) 2400

243 1 244 2400 Technician changed 243 Array data at 1 ( 244) 2400 to 30 ( 273) 2400"

244 1 244 2400 Technician changed 244 Array data at 1 ( 244) 2400

to 30 ( 273) 2400

Data points were reviewed before and after the following errors. The relative

humidity was near 100%, it was most likely a rain event. The data were left in.

Array Day Julian Time Error

151 27 270 2130 Precip difference from 27 ( 270) 2130 (

1.27) to 27 ( 270) 2145 ( 9.906) is gr

151 27 270 2145 Precip difference from 27 ( 270) 2145 (

9.906) to 27 ( 270) 2200 ( 4.318) is g

October 2002

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 10/01/02 0000 - 10/31/02 2400. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

101 1 274 100 Technician changed 101 Array data at 1 ( 274) 100

to 31 ( 304) 2400

150 1 274 15 Technician changed 150 Array data at 1 ( 274) 15

to 31 ( 304) 2400

241 1 274 2400 Technician changed 241 Array data at 1 ( 274) 2400

to 31 ( 304) 2400

243 1 274 2400 Technician changed 243 Array data at 1 ( 274) 2400

to 31 ( 304) 2400

244 1 274 2400 Technician changed 244 Array data at 1 ( 274) 2400

to 31 ( 304) 2400

Data points were reviewed before and after the following error. There was a

change in the readings, but the cause is unknown. The data were suspect, but

left in.

Array Day Julian Time Error

150 27 300 500 Air temp difference from 27 ( 300) 500 (

4.5636) to 27 ( 300) 515 ( 7.5838) is greater than 3.0 degrees C

November 2002

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed many times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

An error message of "Pressure is greater than 1040 or less than 980" occurred

for all 15 minute data from 11/01/02 0000 - 11/07/02 1030. This was due to

improper installation of the barometric pressure sensor (the jumper was not

installed). These data were removed.

Array Day Julian Time Error

101 1 305 100 Technician changed 101 Array data from 1 ( 305) 100

to 7 ( 311) 1100

150 1 305 15 Technician changed 150 Array data from 1 ( 305) 15

to 7 ( 311) 1030

241 1 305 2400 Technician changed 241 Array from 1 ( 305) 2400 to

6 ( 310) 2400

243 1 305 2400 Technician changed 243 Array data from 1 ( 305) 2400

to 6 ( 310) 2400

244 1 305 2400 Technician changed 244 Array data from 1 ( 305) 2400

to 7 ( 311) 2400

Data points were reviewed before and after the following error. The data appears

consistent, and it was likely an event. The data were left in.

Array Day Julian Time Error

150 11 315 1330 Air temp difference from 11 ( 315) 1330

( 21.162) to 11 ( 315) 1345 ( 18.081) is greater than 3.0 degrees C

The following error occurred because the "1 hour data" is averaged from 5-second

readings taken during that hour while the "15 minute data" (in this case the 15

minute maximum) is not averaged, and only recorded at 15-minute intervals. The

data were left in.

Array Day Julian Time Error

101 16 320 1300 Air temp average in 1 hour data (-.4325)

is less than 15 minute minimum (-.38942) by at least 10%

101 16 320 1500 Air temp average in 1 hour data (-.22167)

is less than 15 minute minimum (-.18801) by at least 10%

101 27 331 400 Air temp average in 1 hour data ( .02151)

is greater than 15 minute maximum ( .00669) by at least 10%

December 2002

Data points were reviewed before and after the following error. The data appears

consistent, and it was likely an event. The data were left in.

Array Day Julian Time Error

150 19 353 1100 Air temp difference from 19 ( 353) 1100

(-1.3718) to 19 ( 353) 1115 ( 3.3897) is greater than 3.0 degrees C

Anomalous criteria for wind speed (i.e. "wind speed is less than 0.5m/s") were

listed a few times in the WDMP error report for this month as possible errors.

We are certain the sensor was operating properly, most likely there was simply

no wind. The data were left in.

Array Day Julian Time Error

102 4 338 2000 Wind speed is less than 0.5 m/s from 4 (

338) 2000 to 5 ( 339) 1200

102 5 339 1400 Wind speed is less than 0.5 m/s from 5 (

339) 1400 to 6 ( 340) 1800

102 10 344 1500 Wind speed is less than 0.5 m/s from 10

( 344) 1500 to 11 ( 345) 1000

102 12 346 1300 Wind speed is less than 0.5 m/s from 12

( 346) 1300 to 14 ( 348) 600

102 15 349 1800 Wind speed is less than 0.5 m/s from 15

( 349) 1800 to 16 ( 350) 900

102 19 353 2400 Wind speed is less than 0.5 m/s from 19

( 353) 2400 to 20 ( 354) 1300

102 24 358 1600 Wind speed is less than 0.5 m/s from 24

( 358) 1600 to 25 ( 359) 700

102 27 361 1400 Wind speed is less than 0.5 m/s from 27

( 361) 1400 to 28 ( 362) 1000

102 28 362 1600 Wind speed is less than 0.5 m/s from 28

( 362) 1600 to 29 ( 363) 1200

The following error occurred because the "1 hour data" is averaged from 5-second

readings taken during that hour while the "15 minute data" (in this case the 15

minute maximum) is not averaged, and only recorded at 15-minute intervals. The

data were left in.

Array Day Julian Time Error

101 7 341 1800 Air temp average in 1 hour data (-.02553)

is greater than 15 minute maximum (-.05381) by at least 10%

101 20 354 2400 Air temp average in 1 hour data ( .53791)

is greater than 15 minute maximum ( .47657) by at least 10%

Deleted erroneous daily minimum barometric pressure value on December 20 from array

244.

Array Day Julian Time Error

244 20 354 2400 Technician changed 244 Array data from 20 ( 354) 2400

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.

Data are missing due to equipment failure, or no probes deployed, or maintenance

of equipment. To find out more details about missing data, contact the Research

Coordinator at the site submitting the data.

January 2002

The equipment was under repair from 01/03/02 1300 - 01/14/02 1630. Data is

missing for this time period.

Array Julian Day Time Error

150 3 3 1315 Missing 150 Array data (15 minute data) from

3 ( 3) 1315 to 14 ( 14) 1615

101 3 3 1400 Missing 101 Array data (Hourly Averages) from

3 ( 3) 1400 to 14 ( 14) 1600

102 3 3 1400 Missing 102 Array data (Hourly Average Wind Parameters)

from 3 ( 3) 1400 to 14 ( 14) 1600

241 3 3 2400 Missing 241 data (Daily Averages) from 3 ( 3) 2400

to 13 ( 13) 2400

242 3 3 2400 Missing 242 data (Daily Average Wind Parameters)

from 3 ( 3) 2400 to 13 ( 13) 2400

243 3 3 2400 Missing 243 data (Daily Max/Time Values) from

3 ( 3) 2400 to 13 ( 13) 2400

244 3 3 2400 Missing 244 data (Daily Min/Time Values) from

3 ( 3) 2400 to 13 ( 13) 2400

May 2002

Data was missing May 3 1415-1430 due to maintenance on the station.

Array Julian Day Time Error

150 123 3 1415 Missing 150 Array data (15 minute data) from 3 ( 123)

1415 to 3 ( 123) 1430

June 2002

Array Day Julian Time Error

150 3 154 800 Missing 150 Array data (15 minute data)

from 3 ( 154) 800 to 3 ( 154) 1345

101 3 154 700 Missing 101 Array data (Hourly Averages)

from 3 ( 154) 900 to 3 ( 154) 2300

102 3 154 700 Missing 102 Array data (Hourly Average

Wind Parameters) from 3 ( 154) 900 to 3 ( 154) 2300

13. Other Remarks/notes:

**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.

All sensors were replaced with newly calibrated sensors on 06/03/02 1400.

The following data are Daily Totals for Precipitation: (Note that there are no monthly totals during months where there was missing data).

Jan 2002

Calendar Day Daily Precipitation Totals (mm)

17 4.064

20 1.270

21 .254

22 4.572

23 .762

24 .508

30 2.794

31 3.810

Feb 2002

Calendar Day Daily Precipitation Totals (mm)

1 7.620

10 7.874

11 2.032

17 3.048

20 1.524

22 .254

27 1.524

Monthly Tot 23.9

Mar 2002

Calendar Day Daily Precipitation Totals (mm)

2 2.540

3 15.748

9 .254

10 3.556

16 8.636

18 4.318

20 18.542

26 20.574

27 1.270

30 4.318

31 2.794

"Monthly Total" 82.5

Apr 2002

Calendar Day Daily Precipitation Totals (mm)

1 2.540

3 7.874

9 .762

12 .508

13 4.318

14 3.810

15 5.334

19 3.302

20 .762

22 2.540

25 13.716

28 33.528

29 2.286

30 1.016

"Monthly Total" 82.3

May 2002

Calendar Day Daily Precipitation Totals (mm)

2 19.558

3 .254

7 .508

9 .508

12 9.144

13 33.274

14 4.318

17 .254

18 23.622

21 1.016

24 .254

26 3.048

28 1.270

31 13.208

Jun 2002

Calendar Day Daily Precipitation Totals (mm)

5 12.192

6 23.622

7 10.922

12 .508

14 13.462

15 12.446

16 1.778

18 1.016

22 8.636

23 1.524

24 .254

26 6.604

27 1.778

Jul 2002

Calendar Day Daily Precipitation Totals (mm)

9 2.794

18 .254

19 6.604

20 .254

23 9.144

24 .254

27 .254

28 .508

"Monthly Total" 20.1

Aug 2002

Calendar Day Daily Precipitation Totals (mm)

1 3.810

2 9.398

3 .254

5 9.906

16 1.270

18 .508

20 12.446

24 4.572

25 .254

28 .254

29 34.798

Monthly Total 77.5

Sep 2002

Calendar Day Daily Precipitation Totals (mm)

1 .254

4 6.096

15 21.336

16 18.288

17 .254

22 4.826

26 8.382

27 38.354

28 .508

Monthly Total 98.3

Oct 2002

Calendar Day Daily Precipitation Totals (mm)

2 1.016

4 4.064

5 2.032

7 .508

10 2.794

11 39.624

12 38.862

13 1.524

16 27.432

17 1.270

19 .508

25 3.556

26 17.018

Monthly Total 140.2

Nov 2002

Calendar Day Daily Precipitation Totals (mm)

4 .254

5 3.302

6 14.986

11 2.032

12 17.272

13 .762

16 19.558

17 24.638

18 7.620

19 .508

21 2.032

22 14.986

23 .254

26 .254

27 2.794

Monthly Total 111.3

Dec 2002

Calendar Day Daily Precipitation Totals (mm)

5 5.588

11 8.128

12 30.480

13 6.350

14 10.668

16 .254

20 16.002

25 14.224

26 12.954

30 .254

31 2.032

Monthly Total 106.9