Hudson River (HUD) NERR Meteorological Metadata

January 2003 - December 2003

Latest Update: **February 7, 2023**

I. Data Set & Research Descriptors

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2. Entry verification:

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

sensor on the weather station to a Campbell Scientific CR10X datalogger. The sensors

and data collection schedule (Section 4) were controlled by the CDMO Datalogger

Program (hud30.csi), which was loaded onto the CR10X. 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 a

computer. All raw data files were archived at the CDMO and at the reserve on CD-

ROM.

After data upload, the CDMO Weather Data Management Program (WDMP) was

used to convert the data into database format. This program was developed in Visual

Basic to interface with the NERRS data collection schedule. There were three main tasks

completed by the WDMP: conversion of the comma delimited monthly raw data file

(.DAT) into a Microsoft Access database, checking the data against a predetermined set

of error criteria (Section 4), and production of error and summary reports. Anomalous

data were investigated and documented in Section 11. The most commonly reported

error was wind speed below the 0.5 m/s criteria. Missing data were documented in

Section 12.

On October 23, 2003 the CDMO datalogger program NERR\_4.csi was loaded onto the CR10X.

The new program corrected many problems encountered with the previous program. Data

were stored via cable on a Campbell Scientific SM 4M storage module and uploaded as

described previously. Raw data files (.DAT) were opened in Microsoft Excel for pre-

processing with the EQWin format macro, developed by the CDMO. EQwin now replaces the

WDMP as the NERR MET primary QA/QC program. The macro reformats the header columns,

inserts station codes, inserts a date column, corrects the time column format, and

reformats the data to an appropriate number of decimal places. The pre-processed

file was then copied into EQWin, where the data were QA/QC'd and archived in a database.

EQWin queries, reports and graphs were used to discover outliers and large changes in

the data. Any anomalous data were investigated and noted as previously described.

The Research Assistant is responsible for data verification.

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.

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 of air temperature, relative humidity, barometric pressure, precipitation,

photosynthetically active radiation, and wind speed and direction are taken throughout

the year at the Tivoli Bays Field Station. A water quality monitoring program has been

ongoing since 1991 at this component site, and the meteorological monitoring provides

ancillary data. This helps us to better understand the relationships between the

atmospheric conditions and aquatic environments at this site.

4. Research methods:

For routine maintenance, sensors were investigated at least once a month to

ensure there was no damage or blockage. According to Campbell Scientific, sensors are

to be calibrated every 1-2 years for proper data collection. Sensors were shipped to their

respective manufacturers for proper and professional calibration. In order to avoid

missing data, two sets of sensors are available. Upon return from the manufacturers,

newly calibrated sensors were used to replace the sensors on the tower.

For data collection, the CR10X datalogger was programmed to collect data in the

following formats:

1. 15-minute data are collected instantaneously for Air Temperature (C),

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

Wind Direction (degrees). 15-minute Precipitation (mm) and PAR

(mmol/m^2) data are totaled from 5-second readings, prior to NERR\_4.CSI

1. 15-minute average, maximum and minimum data are averages of 5-second

readings for Air Temperature (oC), Relative Humidity (%), Barometric

Pressure (mb) and Wind Speed (m/s) with NERR\_4.CSI.

iii) Hourly average, maximum, and minimum data are averages of 5-second

readings for Air Temperature (oC), Relative Humidity (%), Barometric

Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly

totals for PAR (mmol/m^2) and Precipitation (mm) are totals of 15-minute

readings.

iv) Daily average, maximum and minumum data are averages of 5-second

readings for Air Temperature (oC), Relative Humidity (%), Barometric

Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals

for PAR (mmol/m^2) and Precipitation (mm) are totals of 15-minute readings.

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

was retrieved monthly. The data were downloaded and pre-processed as described in

Section 2. QA/QC of the data was conducted using either the WDMP or EQWin.

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

criteria:

Air Temp:

- 15 min sample not greater than max for the day

- 15 min sample not less than the min for the day

- 15 min sample not greater than 3.0 C from the previous 15 minutes (WDMP only)

- Max and min temp recorded for the day (WDMP only)

- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the

hour (WDMP only)

-Sample not greater than 50 C or less than –30 C (EQWin only)

Relative Humidity:

-Not changed by more than 25% from the previous 15 minutes (WDMP only)

-Max and min humidity recorded for the day (WDMP only)

-1-hour average not greater than 10% above the greatest 15 min sample recorded in the

hour (WDMP only)

-Sample not greater than 100% or less than 0% (EQWin only)

Pressure:

- Pressure not greater than 1040 mb or less than 980 mb (WDMP only)

- Pressure changes greater than 5 mb per hour (WDMP only)

- Maximum and minimum values recorded for the day (WDMP only)

-1-hour average not greater than 10% above the greatest 15 min sample recorded in the

hour (WDMP only)

-Sample not greater than 1060 mb or less than 900 mb (EQWin only)

Wind Speed:

- Wind speed not greater than 30 m/s or less than 0.5 m/s (WDMP only)

-Wind speed not greater than 30 m/s (EQWin only)

-Wind speed not less than 0.5 m/s for 12 consecutive hours (EQWin only)

Wind Direction:

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

Rainfall:

- Precipitation not greater than 5 mm in 15 min

- No precipitation for the month (WDMP only)

Photosynthetically Active Radiation (PAR):

-Sample not greater than 5000 mmol/m^2 or less than –0.5 mmol/m^2

Time:

- 15-minute interval recorded

For all data:

- No duplicate data

5. Site location and character:

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

component site totaling approximately 5,000 acres. Each component of the reserve is

referenced by River Mile (RM) of the Hudson River in New York State proceeding north

from the southern tip of Manhattan (RM 0). The reserve includes the following four

component sites: Piermont Marsh, Rockland County (RM 24)(41o02'30"N 73o54'15"W),

Iona Island, Rockland County (RM 45)(41o18'15"N 73o58'45"W), Tivoli Bays, Dutchess

County (RM 98)(42o02'15"N 73o55'10"W), and Stockport Flats, Columbia County (RM

124)(42o02'30"N 73o46'00"W). The four component sites include open water, tidal

wetland, and adjacent upland buffer habitats and are representative of the diverse plant

and animal communities that occupy the salinity gradient within the Hudson River

Estuary. Development within the watersheds of the four 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). The weather monitoring equipment is

mounted on a 30-foot aluminum tower. The tower is on the west side deck of the office

building, 9 feet off the ground. The wind anemometer and wind speed sensors are

located at the top of the tower, 39 feet off the ground. The light sensor is attached to the

tower, 16 feet off the ground. The datalogger and the 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 Tivoli South Bay water quality monitoring station, 2.3 miles Southeast

of the Tivoli North Bay water quality monitoring station, and 0.2 miles Northwest of the

Saw Kill Creek water quality monitoring station.

6. Data collection period:

Weather data were collected for the entire year in 2003. Weather data have been

collected at the Field Station at Tivoli Bays since July 1999.

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 investigators and contact

persons), from the Data Manager at the Centralized Data Management Office (please see

personnel directory under the general information link on the CDMO home page) and

online at the CDMO home page (http://cdmo.baruch.sc.edu/). Data are available in text

format and as 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 of the

freshwater tidal marshes at the Tivoli Bays component site. Measurements include

seston, dissolved oxygen, alkalinity, pH, temperature, salinity, conductivity, and

concentrations of nitrate, phosphate, sulfate, and chloride. These data are used in

conjunction with the meterological monitoring data to help us better understand the

relationships between the atmospheric and aquatic environments at this site.

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

Parameter: Temperature

Units: Celsius

Sensor type: Platinum resistance temperature detector (PRT)

Model #: HMP45C Temperature and Relative Humidity Probe

Operating Temperature: -40°C to +60°C

Range: -40°C to +60°C

Accuracy: ± 0.2 °C @ 20°C

Date of Last calibration: May 2003

Parameter: Relative Humidity

Units: Percent

Sensor type: Vaisala HUMICAP© 180 capacitive relative humidity sensor

Model #: HMP45C Temperature and Relative Humidity Probe

Range: 0-100% non-condensing

Accuracy at 20°C: +/- 2% RH (0-90%) and +/- 3% (90-100%)

Temperature dependence of RH measurement: +/- 0.05% RH/°C

Date of Last calibration: May 2003

Parameter: Barometric Sensor

Units: millibars (mb)

Sensor type: Vaisala Barocap © silicon capacitive pressure sensor

Model #: CS-105

Operating Range: Pressure: 600 to 1060 mb; Temperature: -40°C to +60°C;

Humidity: non-condensing

Accuracy: ± 0.5 mb @ 20°C; +/- 2 mb @ 0°C to 40°C; +/- 4 mb @ -20°C to 45°C; +/- 6

mb @ -40°C to 60°C

Stability: ± 0.1 mb per year

Date of Last calibration: May 2002

Parameter: Wind speed

Units: meter per second (m/s)

Sensor type: 18 cm diameter 4-blade helicoids propeller molded of polypropylene

Model #: R.M. Young 05103 Wind Monitor

Range: 0-60 m/s (130 mph); gust survival 100 m/s (220 mph)

Accuracy: +/- 2%

Date of last calibration: May 2003

Parameter: Wind direction

Units: degrees

Sensor type: balanced vane, 38 cm turning radius

Model #: R.M. Young 05103 Wind Monitor

Range: 360° mechanical, 355° electrical (5° open)

Accuracy: +/- 5%

Date of last calibration: May 2003

Parameter: LI-COR Quantum Sensor

Units: mmoles m-2 (total flux)

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

Model #: LI190SB

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

Stability: <±2% change over 1 yr

Operating Temperature: -40°C to 65°C; Humidity: 0 to 100%

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

Date of last calibration: May 2002

Parameter: Precipitation

Units: millimeters (mm)

Sensor type: Tipping Bucket Rain Gauge (heated)

Model #: TE525

Rainfall per tip: 0.01 inch

Operating range: Temperature: 0° to +/- 50°C; Humidity: 0 to 100%

Accuracy: +/- 1.0% up to 1 in./hr; +0, -3% from 1 to 2 in./hr; +0, -5% from 2 to 3 in./hr

Date of Last calibration: May 2003

Storage Module

Model #: SM192

Storage capacity: 192,896 bytes

Operating range: Temperature: -35° to +65°C

Processor: Hitachi 6303

Baud rates: 300, 1200, 9600, 76800

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

Power requirements: 5 +/-0.4 VDC @ 100 mA

Storage Module

Model #: SM4M

Storage capacity: 2 million low-resolution data values

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

Processor: Hitachi H8S

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

Operating range: Temperature: -35° to +65°C

Baud rates: 9600, 76800

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

Power requirements: 5 +/-0.3 VDC @ 100 mA

Campbell Scientific CR10X Wiring Panel has 128K of flash memory (EEPROM), in

which it stores the operating system and it's program (that it uses to run the weather

station). Additionally, there are 128K of SRAM, which it uses to run the program and

store its measurements and for final data storage.

10. Coded variable indicator and variable code definitions:

FS - Field Station at Tivoli Bays

EQWin station code - hudfsmet

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.

FS

January 2003

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

102 2 2 2400 Wind speed is less than 0.5 m/s from 2 ( 2) 2400 to 3 ( 3)

1400

102 5 5 1400 Wind speed is less than 0.5 m/s from 5 ( 5) 1400 to 6 ( 6)

1300

102 24 24 2000 Wind speed is less than 0.5 m/s from 24 ( 24) 2000 to 25

( 25) 1000

102 27 27 1900 Wind speed is less than 0.5 m/s from 27 ( 27) 1900 to 28

( 28) 900

102 28 28 1700 Wind speed is less than 0.5 m/s from 28 ( 28) 1700 to 29

( 29) 900

102 29 29 1600 Wind speed is less than 0.5 m/s from 29 ( 29) 1600 to 30

( 30) 1000

102 30 30 1700 Wind speed is less than 0.5 m/s from 30 ( 30) 1700 to 31

( 31) 800

Data points were reviewed before and after the following anomalous barometric pressure

readings. The data appear consistent, and the cause of the low readings was likely an

event. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

150 9 9 315 Pressure is greater than 1040 or less than 980 on 9 ( 9) 315

( 979.92)

150 9 9 330 Pressure is greater than 1040 or less than 980 on 9 ( 9) 330

( 979.55)

150 9 9 345 Pressure is greater than 1040 or less than 980 on 9 ( 9) 345

( 979.18)

150 9 9 400 Pressure is greater than 1040 or less than 980 on 9 ( 9) 400

( 979.18)

150 9 9 415 Pressure is greater than 1040 or less than 980 on 9 ( 9) 415

( 979.05)

150 9 9 430 Pressure is greater than 1040 or less than 980 on 9 ( 9) 430

( 978.81)

150 9 9 445 Pressure is greater than 1040 or less than 980 on 9 ( 9) 445

( 978.93)

150 9 9 500 Pressure is greater than 1040 or less than 980 on 9 ( 9) 500

( 978.93)

150 9 9 515 Pressure is greater than 1040 or less than 980 on 9 ( 9) 515

( 979.18)

150 9 9 530 Pressure is greater than 1040 or less than 980 on 9 ( 9) 530

( 979.42)

150 9 9 545 Pressure is greater than 1040 or less than 980 on 9 ( 9) 545

( 979.8)

Data points were reviewed before and after the following anomalous barometric pressure

readings. There was a change in the readings, but the cause is unknown. The following

data are suspect, but were left in:

Array ID Calendar Date Julian Day Time Error Message

150 2 2 1015 Pressure difference from 2 ( 2) 1015 ( 992.97) to 2 ( 2)

1030 ( 1017.8) is greater than 5 mb

February 2003

Data points were reviewed before and after the following anomalous relative humidity

reading. The data appear consistent, and the cause of the anomalous reading was likely

an event. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

150 12 43 930 Rel hum difference from 12 ( 43) 930 ( 51.727) to 12

(43) 945 ( 84.235) is greater than 25%

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

102 1 32 1400 Wind speed is less than 0.5 m/s from 1 ( 32) 1400 to 2

(33) 600

102 3 34 1600 Wind speed is less than 0.5 m/s from 3 ( 34) 1600 to 4

(35) 1200

102 9 40 2100 Wind speed is less than 0.5 m/s from 9 ( 40) 2100 to 10

(41) 900

102 11 42 1700 Wind speed is less than 0.5 m/s from 11 ( 42) 1700 to 12

( 43) 500

102 18 49 1800 Wind speed is less than 0.5 m/s from 18 ( 49) 1800 to 19

( 50) 900

102 21 52 1700 Wind speed is less than 0.5 m/s from 21 ( 52) 1700 to 22

( 53) 1700

102 22 53 1900 Wind speed is less than 0.5 m/s from 22 ( 53) 1900 to 23

( 54) 1200

102 24 55 1900 Wind speed is less than 0.5 m/s from 24 ( 55) 1900 to 25

( 56) 800

102 26 57 1800 Wind speed is less than 0.5 m/s from 26 ( 57) 1800 to 27

( 58) 800

102 27 58 1800 Wind speed is less than 0.5 m/s from 27 ( 58) 1800 to 28

( 59) 800

Data points were reviewed before and after the following anomalous barometric pressure

readings. The data appear consistent and the vent on the probe was not obstructed. The

cause of the high readings was likely an event. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

150 16 47 745 Pressure is greater than 1040 or less than 980 on 16 ( 47)

745 ( 1040.3)

150 16 47 800 Pressure is greater than 1040 or less than 980 on 16 ( 47)

800 ( 1040.4)

150 16 47 815 Pressure is greater than 1040 or less than 980 on 16 ( 47)

815 ( 1040.5)

150 16 47 830 Pressure is greater than 1040 or less than 980 on 16 ( 47)

830 ( 1040.5)

150 16 47 845 Pressure is greater than 1040 or less than 980 on 16 ( 47)

845 ( 1040.9)

150 16 47 900 Pressure is greater than 1040 or less than 980 on 16 ( 47)

900 ( 1040.8)

150 16 47 915 Pressure is greater than 1040 or less than 980 on 16 ( 47)

915 ( 1040.3)

150 16 47 930 Pressure is greater than 1040 or less than 980 on 16 ( 47)

930 ( 1040.2)

The following error occurred because there were a number of days with missing data

recorded (i.e. 1111's) and the WDMP performed calculations using data that were

collected several days apart. The following data were left in:

Array ID Calendar Date Julian Day Time Error Message

150 5 36 1315 Pressure difference from 5 ( 36) 1315 ( 1012.9) to 7 ( 38)

1615 ( 1007.2) is greater than 5 mb

March 2003

An anomalous daily minimum barometric pressure of 600mb was deleted from the following array.

15 and 60 minute data appear normal:

Array ID Calendar Day Julian Date Time"

244 11 70 2400

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with temperature, the cause of the anomalous

readings was most likely an event. The following data were left in:

Array ID Calendar Day Julian Date Time" "Error Message"

150 29 88 1530 "Air temp difference from 29 ( 88) 1530 ( 19.438)

to 29 ( 88) 1545 ( 16.156) is greater than 3.0 degrees C"

Data points were reviewed before and after the following anomalous precipitation

readings. Other parameters changed along with precipitation and the relative humidity

was near 100%. The cause of the error was most likely a rain event. The following data

were left in:

"Array ID""Calendar Day" "Julian Date" "Time" "Error Message"

151 29 88 1545 "Precip difference from 29 ( 88) 1545 ( 1.27) to 29

( 88) 1600 ( 7.874) is greater than 5 mm"

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

"Array ID""Calendar Day" "Julian Date" "Time" "Error Message"

102 15 74 1800 "Wind speed is less than 0.5 m/s from 15 ( 74) 1800 to 16

( 75) 900"

102 17 76 1600 "Wind speed is less than 0.5 m/s from 17 ( 76) 1600 to 18

( 77) 500"

102 20 79 1700 "Wind speed is less than 0.5 m/s from 20 ( 79) 1700 to 21

( 80) 500"

102 21 80 1600 "Wind speed is less than 0.5 m/s from 21 ( 80) 1600 to 22

( 81) 1000"

102 23 82 1900 "Wind speed is less than 0.5 m/s from 23 ( 82) 1900 to 24

( 83) 900"

102 26 85 1800 "Wind speed is less than 0.5 m/s from 26 ( 85) 1800 to 27

( 86) 800"

102 27 86 1800 "Wind speed is less than 0.5 m/s from 27 ( 86) 1800 to 28

( 87) 900"

April 2003

Data points were reviewed before and after the following anomalous air temperature

reading. The data appear consistent, the cause of the anomalous reading was likely an

event. The following data were left in:

"Array ID""Calendar Day""Julian Date" "Time" "Error Message"

150 16 106 1330 "Air temp difference from 16 ( 106) 1330 ( 25.751) to 16

(106) 1345 ( 22.203) is greater than 3.0 degrees C"

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

"Array ID""Calendar Day""Julian Date" "Time" "Error Message"

102 4 94 600 "Wind speed is less than 0.5 m/s from 4 ( 94) 600 to 5

(95) 300"

102 7 97 1700 "Wind speed is less than 0.5 m/s from 7 ( 97) 1700 to 8

(98) 1000"

102 8 98 1400 "Wind speed is less than 0.5 m/s from 8 ( 98) 1400 to 9

(99) 1100"

102 10 100 1800 "Wind speed is less than 0.5 m/s from 10 ( 100) 1800 to

11 ( 101) 1200"

102 22 112 1700 "Wind speed is less than 0.5 m/s from 22 ( 112) 1700 to

23 ( 113) 500"

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

readings while the "15 minute data" are discrete readings. The following data were left

in:

"Array ID""Calendar Day""Julian Date" "Time" "Error Message"

101 4 94 300 "Air temp average in 1 hour data ( .12008) is greater than

15 minute maximum ( .08054) by at least 10%"

101 4 94 400 "Air temp average in 1 hour data ( .03065) is greater than

15 minute maximum ( .0134) by at least 10%"

May 2003

An anomlous daily minimum temperature for 5/16 was 6.6C at 2349 (output in array 244). Data

were retained.

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with temperature, the cause of the anomalous

readings was most likely an event. The following data were left in:

Array ID Calendar Da Julian Da Time Error Messag

150 2 122 1345 Air temp difference from 2 ( 122) 1345 ( 18.893) to 2

(122) 1400 ( 13.266) is greater than 3.0 degrees C

150 15 135 1315 Air temp difference from 15 ( 135) 1315 ( 19.277) to 15

( 135) 1330 ( 22.76) is greater than 3.0 degrees C

150 30 150 1315 Air temp difference from 30 ( 150) 1315 ( 23.809) to 30

( 150) 1330 ( 20.126) is greater than 3.0 degrees C

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Da Julian Da Time Error Messag

102 4 124 1900 Wind speed is less than 0.5 m/s from 4 ( 124) 1900 to 5

( 125) 1100

102 7 127 1900 Wind speed is less than 0.5 m/s from 7 ( 127) 1900 to 8

( 128) 1400

102 10 130 1900 Wind speed is less than 0.5 m/s from 10 ( 130) 1900 to

11 ( 131) 1000

102 13 133 1800 Wind speed is less than 0.5 m/s from 13 ( 133) 1800 to

14 ( 134) 900

102 14 134 2000 Wind speed is less than 0.5 m/s from 14 ( 134) 2000 to

15 ( 135) 900

102 16 136 1800 Wind speed is less than 0.5 m/s from 16 ( 136) 1800 to

17 ( 137) 900

102 17 137 1900 Wind speed is less than 0.5 m/s from 17 ( 137) 1900 to

18 ( 138) 800

102 18 138 2000 Wind speed is less than 0.5 m/s from 18 ( 138) 2000 to

19 ( 139) 800

102 19 139 1800 Wind speed is less than 0.5 m/s from 19 ( 139) 1800 to

20 ( 140) 900

102 21 141 2400 Wind speed is less than 0.5 m/s from 21 ( 141) 2400 to

25 ( 145) 1100

102 25 145 2000 Wind speed is less than 0.5 m/s from 25 ( 145) 2000 to

26 ( 146) 1300

102 26 146 1500 Wind speed is less than 0.5 m/s from 26 ( 146) 1500 to

27 ( 147) 1000

102 27 147 1500 Wind speed is less than 0.5 m/s from 27 ( 147) 1500 to

28 ( 148) 1000

102 28 148 1400 Wind speed is less than 0.5 m/s from 28 ( 148) 1400 to

29 ( 149) 200

102 29 149 1000 Wind speed is less than 0.5 m/s from 29 ( 149) 1000 to

30 ( 150) 1000

102 30 150 1300 Wind speed is less than 0.5 m/s from 30 ( 150) 1300 to

31 ( 151) 2400

June 2003

Data points were reviewed before and after the following anomalous relative humidity

readings. Other parameters changed along with the relative humidity, the cause of the

anomalous readings was most likely an event. The following data were left in:

Array ID Calendar Da Julian Da Time Error Messag

150 2 153 800 "Rel hum difference from 2 ( 153) 800 ( 84.455) to

2 ( 153) 815 ( 58.83) is greater than 25%"

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Da Julian Da Time Error Messag

102 2 153 2000 "Wind speed is less than 0.5 m/s from 2 ( 153)

2000 to 3 ( 154) 1000"

102 6 157 1600 "Wind speed is less than 0.5 m/s from 6 ( 157)

1600 to 9 ( 160) 300"

102 10 161 1700 "Wind speed is less than 0.5 m/s from 10 ( 161)

1700 to 11 ( 162) 800"

102 12 163 1200 "Wind speed is less than 0.5 m/s from 12 ( 163)

1200 to 14 ( 165) 900"

102 18 169 500 "Wind speed is less than 0.5 m/s from 18 ( 169)

500 to 19 ( 170) 1000"

102 20 171 1300 "Wind speed is less than 0.5 m/s from 20 ( 171)

1300 to 21 ( 172) 2100"

102 22 173 100 "Wind speed is less than 0.5 m/s from 22 ( 173)

100 to 23 ( 174) 1000"

102 23 174 1400 "Wind speed is less than 0.5 m/s from 23 ( 174)

1400 to 27 ( 178) 1100"

102 27 178 2200 "Wind speed is less than 0.5 m/s from 27 ( 178)

2200 to 28 ( 179) 1000"

102 28 179 1700 "Wind speed is less than 0.5 m/s from 28 ( 179)

1700 to 29 ( 180) 800"

102 29 180 1800 "Wind speed is less than 0.5 m/s from 29 ( 180)

1800 to 30 ( 181) 1100"

July 2003

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with temperature, the cause of the anomalous

readings was most likely an event. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

150 21 202 1900 Air temp difference from 21 ( 202) 1900 ( 26.421) to

21 ( 202) 1915 ( 22.672) is greater than 3.0 degrees C

150 21 202 1915 Air temp difference from 21 ( 202) 1915 ( 22.672) to

21 ( 202) 1930 ( 19.327) is greater than 3.0 degrees C

Data points were reviewed before and after the following anomalous precipitation

readings. Other parameters changed along with precipitation and the relative humidity

was near 100%. The cause of the error was most likely a rain event. The following data

were left in:

Array ID Calendar Day Julian Da Time Error Messag

151 21 202 1915 Precip difference from 21 ( 202) 1915 ( 2.032) to 21

(202) 1930 ( 13.716) is greater than 5mm

151 21 202 1930 Precip difference from 21 ( 202) 1930 ( 13.716) to 21

(202) 1945 ( 2.286) is greater than 5mm

151 22 203 415 Precip difference from 22 ( 203) 415 ( .508) to 22

(203) 430 ( 22.352) is greater than 5mm

151 22 203 430 Precip difference from 22 ( 203) 430 ( 22.352) to 22

(203) 445 ( 3.81) is greater than 5mm

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

102 1 182 1500 Wind speed is less than 0.5 m/s from 1 ( 182) 1500 to

2 ( 183) 800

102 3 184 1800 Wind speed is less than 0.5 m/s from 3 ( 184) 1800 to

4 ( 185) 800

102 5 186 1800 Wind speed is less than 0.5 m/s from 5 ( 186) 1800 to

6 ( 187) 800

102 6 187 1300 Wind speed is less than 0.5 m/s from 6 ( 187) 1300 to

7 ( 188) 1000

102 8 189 1900 Wind speed is less than 0.5 m/s from 8 ( 189) 1900 to

9 ( 190) 900

102 9 190 1100 Wind speed is less than 0.5 m/s from 9 ( 190) 1100 to

10 ( 191) 1000

102 10 191 1500 Wind speed is less than 0.5 m/s from 10 ( 191) 1500 to

11 ( 192) 1400

102 11 192 1700 Wind speed is less than 0.5 m/s from 11 ( 192) 1700 to

12 ( 193) 800

102 12 193 1900 Wind speed is less than 0.5 m/s from 12 ( 193) 1900 to

14 ( 195) 1100

102 14 195 1800 Wind speed is less than 0.5 m/s from 14 ( 195) 1800 to

15 ( 196) 800

102 16 197 1900 Wind speed is less than 0.5 m/s from 16 ( 197) 1900 to

17 ( 198) 900

102 17 198 1500 Wind speed is less than 0.5 m/s from 17 ( 198) 1500 to

18 ( 199) 1500

102 18 199 1800 Wind speed is less than 0.5 m/s from 18 ( 199) 1800 to

19 ( 200) 1000

102 19 200 1500 Wind speed is less than 0.5 m/s from 19 ( 200) 1500 to

20 ( 201) 900

102 22 203 1300 Wind speed is less than 0.5 m/s from 22 ( 203) 1300 to

23 ( 204) 600

102 23 204 1800 Wind speed is less than 0.5 m/s from 23 ( 204) 1800 to

24 ( 205) 800

102 25 206 1200 Wind speed is less than 0.5 m/s from 25 ( 206) 1200 to

26 ( 207) 500

102 28 209 1700 Wind speed is less than 0.5 m/s from 28 ( 209) 1700 to

29 ( 210) 900

102 29 210 1500 Wind speed is less than 0.5 m/s from 29 ( 210) 1500 to

30 ( 211) 900

102 30 211 1900 Wind speed is less than 0.5 m/s from 30 ( 211) 1900 to

31 ( 212) 900

August 2003

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with the air temperature, the cause of the

anomalous readings was most likely an event. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

150 3 215 1500 Air temp difference from 3 ( 215) 1500 ( 28.551) to 3

(215) 1515 ( 24.874) is greater than 3.0 degress C

150 16 228 1415 Air temp difference from 16 ( 228) 1415 ( 33.024) to

16 ( 228) 1430 ( 27.734) is greater than 3.0 degress C

150 16 228 1430 Air temp difference from 16 ( 228) 1430 ( 27.734) to

16 ( 228) 1445 ( 24.188) is greater than 3.0 degress C

150 22 234 1515 Air temp difference from 22 ( 234) 1515 ( 31.419) to

22 ( 234) 1530 ( 26.6) is greater than 3.0 degress C

Data points were reviewed before and after the following anomalous precipitation

readings. Other parameters changed along with precipitation and the relative humidity

was near 100%. The cause of the error was most likely a rain event. The following data

were left in:

Array ID Calendar Day Julian Da Time Error Messag

151 1 213 300 Precip difference from 1 ( 213) 300 ( 6.858) to 1 ( 213)

315 ( .254) is greater than 5 mm

151 3 215 1500 Precip difference from 3 ( 215) 1500 ( 2.286) to 3

(215) 1515 ( 12.954) is greater than 5 mm

151 3 215 1515 Precip difference from 3 ( 215) 1515 ( 12.954) to 3

(215) 1530 ( 7.366) is greater than 5 mm

151 3 215 1530 Precip difference from 3 ( 215) 1530 ( 7.366) to 3

(215) 1545 ( .254) is greater than 5 mm

151 3 215 1615 Precip difference from 3 ( 215) 1615 ( .508) to 3 ( 215)

1630 ( 11.176) is greater than 5 mm

151 3 215 1630 Precip difference from 3 ( 215) 1630 ( 11.176) to 3

(215) 1645 ( 2.794) is greater than 5 mm

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

102 1 213 100 Wind speed is less than 0.5 m/s from 1 ( 213) 100 to 2

( 214) 1200

102 2 214 1700 Wind speed is less than 0.5 m/s from 2 ( 214) 1700 to

3 ( 215) 800

102 3 215 1600 Wind speed is less than 0.5 m/s from 3 ( 215) 1600 to

4 ( 216) 1100

102 4 216 1300 Wind speed is less than 0.5 m/s from 4 ( 216) 1300 to

5 ( 217) 900

102 5 217 1800 Wind speed is less than 0.5 m/s from 5 ( 217) 1800 to

6 ( 218) 900

102 6 218 1700 Wind speed is less than 0.5 m/s from 6 ( 218) 1700 to

7 ( 219) 900

102 7 219 1300 Wind speed is less than 0.5 m/s from 7 ( 219) 1300 to

8 ( 220) 1600

102 8 220 1800 Wind speed is less than 0.5 m/s from 8 ( 220) 1800 to

9 ( 221) 1000

102 9 221 1400 Wind speed is less than 0.5 m/s from 9 ( 221) 1400 to

10 ( 222) 1000

102 10 222 1700 Wind speed is less than 0.5 m/s from 10 ( 222) 1700 to

11 ( 223) 1300

102 11 223 1500 Wind speed is less than 0.5 m/s from 11 ( 223) 1500 to

12 ( 224) 1100

102 12 224 1600 Wind speed is less than 0.5 m/s from 12 ( 224) 1600 to

13 ( 225) 900

102 13 225 1600 Wind speed is less than 0.5 m/s from 13 ( 225) 1600 to

14 ( 226) 1300

102 14 226 1500 Wind speed is less than 0.5 m/s from 14 ( 226) 1500 to

15 ( 227) 1100

102 15 227 1300 Wind speed is less than 0.5 m/s from 15 ( 227) 1300 to

16 ( 228) 200

102 16 228 1800 Wind speed is less than 0.5 m/s from 16 ( 228) 1800 to

17 ( 229) 700

102 17 229 1800 Wind speed is less than 0.5 m/s from 17 ( 229) 1800 to

18 ( 230) 1000

102 18 230 1700 Wind speed is less than 0.5 m/s from 18 ( 230) 1700 to

19 ( 231) 800

102 19 231 1500 Wind speed is less than 0.5 m/s from 19 ( 231) 1500 to

20 ( 232) 1000

102 20 232 1400 Wind speed is less than 0.5 m/s from 20 ( 232) 1400 to

21 ( 233) 900

102 21 233 1300 Wind speed is less than 0.5 m/s from 21 ( 233) 1300 to

22 ( 234) 600

102 23 235 2300 Wind speed is less than 0.5 m/s from 23 ( 235) 2300 to

24 ( 236) 1400

102 24 236 1900 Wind speed is less than 0.5 m/s from 24 ( 236) 1900 to

25 ( 237) 900

102 25 237 1600 Wind speed is less than 0.5 m/s from 25 ( 237) 1600 to

26 ( 238) 900

102 28 240 1500 Wind speed is less than 0.5 m/s from 28 ( 240) 1500 to

29 ( 241) 900

102 30 242 200 Wind speed is less than 0.5 m/s from 30 ( 242) 200 to

30 ( 242) 1900

102 31 243 1300 Wind speed is less than 0.5 m/s from 31 ( 243) 1300 to

31 ( 243) 2400

September 2003

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with temperature, the cause of the anomalous

readings was most likely an event. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

150 14 257 1330 Air temp difference from 14 ( 257) 1330 ( 28.698) to

14 ( 257) 1345 ( 24.077) is greater than 3.0 degress C

Data points were reviewed before and after the following anomalous precipitation

readings. Other parameters changed along with precipitation and the relative humidity

was near 100%. The cause of the error was most likely a rain event. The following data

were left in:

Array ID Calendar Day Julian Da Time Error Messag

151 23 266 730 Precip difference from 23 ( 266) 730 ( 2.032) to 23

(266) 745 ( 16.002) is greater than 5 mm

151 23 266 800 Precip difference from 23 ( 266) 800 ( 13.208) to 23

(266) 815 ( 5.842) is greater than 5 mm

151 28 271 15 Precip difference from 28 ( 271) 15 ( 1.524) to 28

(271) 30 ( 6.604) is greater than 5 mm

151 28 271 30 Precip difference from 28 ( 271) 30 ( 6.604) to 28

(271) 45 ( 1.524) is greater than 5 mm

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

102 1 244 100 Wind speed is less than 0.5 m/s from 1 ( 244) 100 to 5

( 248) 1000

102 6 249 1600 Wind speed is less than 0.5 m/s from 6 ( 249) 1600 to

7 ( 250) 900

102 7 250 1600 Wind speed is less than 0.5 m/s from 7 ( 250) 1600 to

8 ( 251) 400

102 8 251 1600 Wind speed is less than 0.5 m/s from 8 ( 251) 1600 to

9 ( 252) 1000

102 9 252 1700 Wind speed is less than 0.5 m/s from 9 ( 252) 1700 to

10 ( 253) 800

102 10 253 1600 Wind speed is less than 0.5 m/s from 10 ( 253) 1600 to

11 ( 254) 1100

102 11 254 1600 Wind speed is less than 0.5 m/s from 11 ( 254) 1600 to

12 ( 255) 900

102 12 255 1300 Wind speed is less than 0.5 m/s from 12 ( 255) 1300 to

14 ( 257) 1200

102 14 257 1900 Wind speed is less than 0.5 m/s from 14 ( 257) 1900 to

15 ( 258) 900

102 15 258 1500 Wind speed is less than 0.5 m/s from 15 ( 258) 1500 to

16 ( 259) 400

102 16 259 1600 Wind speed is less than 0.5 m/s from 16 ( 259) 1600 to

17 ( 260) 1000

102 17 260 1600 Wind speed is less than 0.5 m/s from 17 ( 260) 1600 to

18 ( 261) 1000

102 18 261 1400 Wind speed is less than 0.5 m/s from 18 ( 261) 1400 to

19 ( 262) 400

102 21 264 1600 Wind speed is less than 0.5 m/s from 21 ( 264) 1600 to

22 ( 265) 1200

102 22 265 1400 Wind speed is less than 0.5 m/s from 22 ( 265) 1400 to

23 ( 266) 500

102 23 266 1900 Wind speed is less than 0.5 m/s from 23 ( 266) 1900 to

24 ( 267) 900

102 25 268 1500 Wind speed is less than 0.5 m/s from 25 ( 268) 1500 to

27 ( 270) 1400

102 27 270 1700 Wind speed is less than 0.5 m/s from 27 ( 270) 1700 to

28 ( 271) 1000

102 28 271 1700 Wind speed is less than 0.5 m/s from 28 ( 271) 1700 to

29 ( 272) 1100

102 29 272 2100 Wind speed is less than 0.5 m/s from 29 ( 272) 2100 to

30 ( 273) 900

Data points were reviewed before and after the following anomalous barometric pressure

readings. The data appear consistent and the vent on the probe was not obstructed. The

cause of the error was likely an event. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

150 8 251 1115 Pressure is greater than 1040 or less than 980 on 8

( 251) 1115 ( 1040.6)

150 8 251 1230 Pressure is greater than 1040 or less than 980 on 8

(251) 1230 ( 1040.8)

150 8 251 1245 Pressure is greater than 1040 or less than 980 on 8

(251) 1245 ( 1042.3)

150 8 251 1315 Pressure is greater than 1040 or less than 980 on 8

(251) 1315 ( 1042.4)

150 8 251 1330 Pressure is greater than 1040 or less than 980 on 8

(251) 1330 ( 1044.9)

150 8 251 1345 Pressure is greater than 1040 or less than 980 on 8

(251) 1345 ( 1045.4)

150 8 251 1400 Pressure is greater than 1040 or less than 980 on 8

(251) 1400 ( 1045.4)

150 8 251 1415 Pressure is greater than 1040 or less than 980 on 8

(251) 1415 ( 1045.6)

150 8 251 1430 Pressure is greater than 1040 or less than 980 on 8

(251) 1430 ( 1044.9)

150 8 251 1445 Pressure is greater than 1040 or less than 980 on 8

(251) 1445 ( 1044.6)

150 8 251 1500 Pressure is greater than 1040 or less than 980 on 8

(251) 1500 ( 1043.8)

150 8 251 1515 Pressure is greater than 1040 or less than 980 on 8

(251) 1515 ( 1041.9)

Data points were reviewed before and after the following anomalous barometric pressure

readings. The probe was functioning properly and the cause of the change in the readings

is unknown. The following data are suspect, but were left in.

Array ID Calendar Day Julian Da Time Error Messag

150 6 249 1600 Pressure difference from 6 ( 249) 1600 ( 1012.4) to 6

(249) 1615 ( 1006.4) is greater than 5mb

150 6 249 1615 Pressure difference from 6 ( 249) 1615 ( 1006.4) to 6

(249) 1630 ( 1015.8) is greater than 5mb

150 7 250 1545 Pressure difference from 7 ( 250) 1545 ( 1000.8) to 7

(250) 1600 ( 1007.5) is greater than 5mb

150 7 250 1600 Pressure difference from 7 ( 250) 1600 ( 1007.5) to 7

(250) 1615 ( 1000.4) is greater than 5mb

150 7 250 1615 Pressure difference from 7 ( 250) 1615 ( 1000.4) to 7

(250) 1630 ( 1006.9) is greater than 5mb

150 7 250 1700 Pressure difference from 7 ( 250) 1700 ( 1004.1) to 7

(250) 1715 ( 1009.4) is greater than 5mb

150 7 250 1745 Pressure difference from 7 ( 250) 1745 ( 1000.7) to 7

(250) 1800 ( 1005.8) is greater than 5mb

150 7 250 1815 Pressure difference from 7 ( 250) 1815 ( 1002) to 7

(250) 1830 ( 1007.9) is greater than 5mb

150 7 250 1900 Pressure difference from 7 ( 250) 1900 ( 1001) to 7

(250) 1915 ( 1008.5) is greater than 5mb

150 7 250 2145 Pressure difference from 7 ( 250) 2145 ( 1006.1) to 7

(250) 2200 ( 1011.5) is greater than 5mb

150 7 250 2300 Pressure difference from 7 ( 250) 2300 ( 1006.4) to 7

(250) 2315 ( 1011.7) is greater than 5mb

150 8 251 145 Pressure difference from 8 ( 251) 145 ( 1004) to 8

(251) 200 ( 1015.7) is greater than 5mb

150 8 251 430 Pressure difference from 8 ( 251) 430 ( 1010.4) to 8

(251) 445 ( 1016.1) is greater than 5mb

150 8 251 615 Pressure difference from 8 ( 251) 615 ( 1011.5) to 8

(251) 630 ( 1017.1) is greater than 5mb

150 8 251 1545 Pressure difference from 8 ( 251) 1545 ( 1035.2) to 8

(251) 1600 ( 1028.5) is greater than 5mb

150 8 251 1600 Pressure difference from 8 ( 251) 1600 ( 1028.5) to 8

(251) 1615 ( 1021.8) is greater than 5mb

150 8 251 1615 Pressure difference from 8 ( 251) 1615 ( 1021.8) to 8

(251) 1630 ( 1015.2) is greater than 5mb

150 8 251 1630 Pressure difference from 8 ( 251) 1630 ( 1015.2) to 8

(251) 1645 ( 1009.9) is greater than 5mb

150 8 251 1745 Pressure difference from 8 ( 251) 1745 ( 994.16) to 8

(251) 1800 ( 1010.5) is greater than 5mb

150 8 251 2130 Pressure difference from 8 ( 251) 2130 ( 1013.1) to 8

(251) 2145 ( 1018.4) is greater than 5mb

150 8 251 2245 Pressure difference from 8 ( 251) 2245 ( 1014.1) to 8

(251) 2300 ( 1020.7) is greater than 5mb

150 9 252 130 Pressure difference from 9 ( 252) 130 ( 1015) to 9

(252) 145 ( 1020.8) is greater than 5mb

150 9 252 245 Pressure difference from 9 ( 252) 245 ( 1015.6) to 9

(252) 300 ( 1022) is greater than 5mb

150 9 252 445 Pressure difference from 9 ( 252) 445 ( 1016.2) to 9

(252) 500 ( 1022.6) is greater than 5mb

150 9 252 930 Pressure difference from 9 ( 252) 930 ( 1029.4) to 9

(252) 945 ( 1034.6) is greater than 5mb

150 9 252 1000 Pressure difference from 9 ( 252) 1000 ( 1037.2) to 9

(252) 1015 ( 1026.1) is greater than 5mb

October 2003 (up to 07:45 on 10/23/03)

Data points were reviewed before and after the following anomalous air temperature

readings. Other parameters changed along with temperature, the cause of the anomalous

readings was most likely an event. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

150 2 275 1430 Air temp difference from 2 ( 275) 1430 ( 11.157) to 2

(275) 1445 ( 7.8042) is greater than 3.0 degrees C

150 10 283 1445 Air temp difference from 10 ( 283) 1445 ( 22.29) to 10

( 283) 1500 ( 25.572) is greater than 3.0 degrees C

Anomalous wind speed readings (i.e. "wind speed is less than 0.5m/s") were listed as

possible errors. The sensor was operating properly and the readings are attributed to low

wind conditions. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

102 1 274 100 Wind speed is less than 0.5 m/s from 1 ( 274) 100 to 2

( 275) 300

102 5 278 1900 Wind speed is less than 0.5 m/s from 5 ( 278) 1900 to

6 ( 279) 900

102 6 279 1500 Wind speed is less than 0.5 m/s from 6 ( 279) 1500 to

7 ( 280) 900

102 7 280 1700 Wind speed is less than 0.5 m/s from 7 ( 280) 1700 to

8 ( 281) 900

102 9 282 1200 Wind speed is less than 0.5 m/s from 9 ( 282) 1200 to

10 ( 283) 1000

102 10 283 1500 Wind speed is less than 0.5 m/s from 10 ( 283) 1500 to

11 ( 284) 1000

102 11 284 1500 Wind speed is less than 0.5 m/s from 11 ( 284) 1500 to

12 ( 285) 1100

102 13 286 1600 Wind speed is less than 0.5 m/s from 13 ( 286) 1600 to

14 ( 287) 1200

102 16 289 1800 Wind speed is less than 0.5 m/s from 16 ( 289) 1800 to

17 ( 290) 900

102 17 290 1600 Wind speed is less than 0.5 m/s from 17 ( 290) 1600 to

18 ( 291) 1000

102 18 291 1400 Wind speed is less than 0.5 m/s from 18 ( 291) 1400 to

19 ( 292) 1000

102 19 292 1600 Wind speed is less than 0.5 m/s from 19 ( 292) 1600 to

20 ( 293) 800

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

readings while the "15 minute data" are discrete readings. The following data were left in:

Array ID Calendar Day Julian Da Time Error Messag

101 6 279 1500 Relative humidity average in 1 hour data ( 55.526) is

greater than 15 minute maximum

October 2003 (starting 09:45 on 10/23/03)

No anomalous data

November 2003

No anomalous data

December 2003

No anomalous data

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, 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 2003

The Li-Cor Quantum Sensor was wired incorrectly after maintenance was performed on

this sensor at 11:35 on 01/06/03. The sensor was not operating correctly, and PAR data

are missing starting at 14:15 on 01/06/03 through 24:00 on 01/31/03.

February 2003

The Li-Cor Quantum Sensor was wired incorrectly after maintenance was performed on

01/06/03. The sensor was not operating correctly, and PAR data are missing for the

entire month.

Data are missing from 13:30 on 02/05/03 to 16:15 on 02/07/03 and the cause is unknown.

The storage module was removed to upload data at 13:25 on 02/05/03, but the station was

still operational and should have recorded data.

Array ID Calendar Date Julian Day Time Error Message

150 5 36 1330 Missing 150 Array data (15 minute data) from 5 ( 36)

1330 to 7 ( 38) 1600

101 5 36 1400 Missing 101 Array data (Hourly Averages) from 5 ( 36)

1400 to 7 ( 38) 1600

102 5 36 1400 Missing 102 Array data (Hourly Average Wind

Parameters) from 5 ( 36) 1400 to 7 (38) 1600

241 5 36 2400 Missing 241 data (Daily Averages) from 5 ( 36) 2400 to 6

( 37) 2400

242 5 36 2400 Missing 242 data (Daily Average Wind Parameters) from

5 ( 36) 2400 to 6 ( 37)

243 5 36 2400 Missing 243 data (Daily Max/Time Values) from 5 ( 36)

2400 to 6 ( 37) 2400

244 5 36 2400 Missing 244 data (Daily Min/Time Values) from 5 ( 36)

2400 to 6 ( 37) 2400

Hourly wind speed and direction calculations at 16:00 on 02/07/03 and daily calculations

for 02/07/07 utilized missing values. The following data were removed:

Array ID Calendar Date Julian Day Time Error Message

102 7 38 1600 Technician changed 102 Array from 7 ( 38) 1600 to 7

( 38) 1600

241 7 38 2400 Technician changed 241 Array from 7 ( 38) 2400 to 7 (

38) 2400

242 7 38 2400 Technician changed 242 Array from 7 ( 38) 2400 to 7 (

38) 2400

243 7 38 2400 Technician changed 243 Array data from 7 ( 38) 2400 to

7 ( 38) 2400

244 7 38 2400 Technician changed 244 Array data from 7 ( 38) 2400 to

7 ( 38) 2400

March 2003

The Li-Cor Quantum Sensor was wired incorrectly after maintenance was performed on

01/06/03. The sensor was not operating correctly, and the data are missing for the entire

month.

April 2003

The Li-Cor Quantum Sensor, which measures photosynthetically active radiation, was

wired incorrectly after maintenance was performed on 01/06/03. The sensor was not

operating correctly, and the data are missing until 17:15 on 04/04/03.

The station was not collecting data due to equipment maintenance from 11:30 – 17:00 on

04/04/03. The following data were removed:

Array ID Calendar Day Julian Da Time Error Messag

101 4 94 1200 Technician changed 101 Array data from 4 ( 94) 1200 to

4 ( 94) 1700

102 4 94 1200 Technician changed 102 Array from 4 ( 94) 1200 to 4 (

94) 1600

150 4 94 1130 Technician changed 150 Array data from 4 ( 94) 1130 to

4 ( 94) 1700

Daily calculations (except precipitation) for 04/04/03 utilized missing values. The

following data were removed:

Array ID Calendar Day Julian Da Time Error Messag

241 4 94 2400 Technician changed 241 Array from 4 ( 94) 2400 to 4 (

94) 2400

242 4 94 2400 Technician changed 242 Array from 4 ( 94) 2400 to 4 (

94) 2400

243 4 94 2400 Technician changed 243 Array data from 4 ( 94) 2400 to

4 ( 94) 2400

244 4 94 2400 Technician changed 244 Array data from 4 ( 94) 2400 to

4 ( 94) 2400

May 2003

Data are missing and the cause is unknown.

Array ID Calendar Da Julian Da Time Error Messag

150 6 126 1445 Missing 150 Array (15 minute data)

June 2003

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

12:30 – 13:30. However, data are missing from 15:00 on 06/03/03 until the station was

shut down at 12:25 on 06/06/03. The cause of this is unknown.

Array ID Calendar Da Julian Da Time Error Messag

150 3 154 1500 "Missing 150 Array data (15 minute data) from 3 ( 154)

1500 to 6 ( 157) 1330"

101 3 154 1500 "Missing 101 Array data (Hourly Averages) from 3 ( 154)

1500 to 6 ( 157) 1300"

102 3 154 1500 "Missing 102 Array data (Hourly Average Wind

Parameters) from 3 ( 154) 1500 to 6 ( 157) 1300"

241 3 154 2400 "Missing 241 data (Daily Averages) from 3 ( 154) 2400 to

6 ( 157) 2400"

242 3 154 2400 "Missing 242 data (Daily Average Wind Parameters) from

3 ( 154) 2400 to 6 ( 157) 2400"

243 3 154 2400 "Missing 243 data (Daily Max/Time Values) from 3 ( 154)

2400 to 6 ( 157) 2400"

244 3 154 2400 "Missing 244 data (Daily Min/Time Values) from 3 ( 154)

2400 to 6 ( 157) 2400"

Hourly data at 14:00 on 6/6/03 utilzed missing data values. The following data where removed:

Array ID Calendar Day Julian Day Time Error Message

101 6 157 1400 Technician changed 101 Array data (Hourly Averages) from

6 (157) 1400 to 6 (157) 1400

102 6 157 1400 Technician changed 102 Array data (Hourly Average

Wind Parameters) from 6 (157) 1400 to 6 (157) 1400

The temperature/relative humidity probe was replaced on 06/06/03. Improper wiring

resulted in temperature readings of -40 and relative humidity readings of 0 until the

problem was discovered and corrected on 07/09/03. All 15 min and hourly temperature

and relative humidity data were removed from 13:30 on 06/06/03 to 24:00 on 06/30/03.

All daily calculations for temperature and relative humidity were removed from 06/06/03

through 06/30/03.

July 2003

The temperature/relative humidity probe was replaced on 06/06/03. Improper wiring

resulted in temperature readings of -40 and relative humidity readings of 0 until the

problem was discovered and corrected on 07/09/03. All 15 min and hourly temperature

and relative humidity data were removed from 00:15 on 07/01/03 until 10:15 on

07/09/03. All daily calculations for temperature and relative humidity data were removed

from 07/01/03 through 07/09/03.

August 2003

No missing data

September 2003

No missing data

October 2003

The weather station was powered down for installation of new CR10x program at 07:40

on 10/23/2003. All data after 07:45 (15-minute) and 08:00 (hourly) and daily totals from

10/23/03 are reported missing in Access and WDMP.

Data collection began again at 09:45 on 10/23/03 and these data are reported in EQWin.

Hourly averages (Array 60) at 10:00 on 10/23/03 and daily averages (Array 144) at 00:00

on 10/24/04 were removed due to the loss of 5-second data used to calculate these

averages.

The temperature/relative humidity sensor was wired improperly for data collection with

the new program. Data are missing until 10:15 on 10/23/03 when the problem was

corrected. Hourly averages (Array 60) for temperature and relative humidity at 11:00 on

10/23/03 were removed due to loss of 5-second data used to calculate these averages.

November 2003

No Missing Data

December 2003

No Missing Data

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.

LiCor (PAR):

Prior to the installation of the new NERR\_4.CSI program on 10/23/2003, all PAR values

less than 0 were altered in the raw data to read 0. These values may indicate an incorrect

multiplier, calibration problems, or a sensor malfunction. Because these values are

changed in the raw data, we cannot confirm that they are all valid data points. After

installation of the new program, queries in EQWin were constructed to identify PAR

values below –0.5, because values between 0 and –0.5 typically occur at night and are

within the normal operating range of the sensor. Values less than –0.5 are considered

anomalous, and are investigated further. Values between 0 and –0.5 that occur during the

day are evident from graphs of the PAR data and are considered anomalous and

investigated further.

Relative Humidity:

Prior to the installation of the new NERR\_4.CSI program on 10/23/2003, all values over

100% were altered in the raw data to read 100%. These values may indicate super

saturated air, calibration problems, or a sensor malfunction. Because these values are

changed in the raw data, we cannot confirm that they are all valid data points. After

installation of the new program, queries in EQWin were constructed to identify relative

humidity readings greater than 100%. Values greater than 100% are considered

anomalous and are investigated further.

The following data are Daily Precipitation Totals for each month:

January 2003

Calendar Day Daily Precipitation Totals (mm)

1 24.892

2 5.080

3 9.398

4 22.860

5 3.048

6 1.016

10 .254

26 .254

Monthly Total 66.8

February 2003

Calendar Day Daily Precipitation Totals (mm)

3 1.016

4 8.382

10 1.016

17 19.812

18 11.430

22 18.034

23 9.144

Monthly Total 68.8

March 2003

Calendar Day Daily Precipitation Totals (mm)

2 9.906

5 3.048

6 3.302

13 4.318

14 1.778

15 .254

20 30.226

21 .508

26 4.064

28 .254

29 25.654

30 1.524

Monthly Total 84.8

April 2003

Calendar Day Daily Precipitation Totals (mm)

3 2.032

4 .508

5 6.350

7 3.556

8 2.794

11 4.572

21 .254

22 5.842

26 11.176

May 2003

Calendar Day Daily Precipitation Totals (mm)

1 3.556

2 3.048

5 .508

7 1.016

8 2.540

9 .254

11 11.176

12 .254

13 .508

21 7.366

22 .254

23 1.524

24 2.540

26 38.354

27 1.270

28 2.794

30 1.270

31 24.384

Monthly Total 102.6

June 2003

Calendar Day Daily Precipitation Totals (mm)

1 16.764

6 4.572

7 15.748

11 2.032

12 41.148

13 5.334

14 .254

18 2.286

20 2.540

21 8.382

22 22.352

29 .254

Monthly Total 121.7

July 2003

Calendar Day Daily Precipitation Totals (mm)

7 8.636

8 .254

9 9.906

11 7.620

16 1.524

18 1.016

21 23.622

22 30.480

23 3.048

24 .508

27 .254

Monthly Total 86.9

August 2003

Calendar Day Daily Precipitation Totals (mm)

1 45.212

2 6.350

3 48.768

4 1.524

5 19.050

6 5.334

7 3.048

8 .508

9 7.112

10 13.970

11 1.778

12 4.318

16 .508

17 6.350

22 2.286

29 5.842

Monthly Total 172.0

September 2003

Calendar Day Daily Precipitation Totals (mm)

1 30.734

2 44.450

3 4.826

4 6.350

13 3.048

14 8.128

15 1.524

16 4.064

19 6.858

22 1.270

23 55.626

25 1.270

26 1.270

27 4.318

28 20.066

29 .508

Monthly Total 194.3

October 2003

Calendar Day Daily Precipitation Totals (mm)

1 .762

2 1.270

4 11.938

14 8.636

15 13.462

19 6.350

22 .762

Total 43.2

Date Tot Prcp (mm)

10/27/2003 1.3

10/28/2003 43.9

10/29/2003 1.3

10/30/2003 38.6

10/31/2003 0.3

Total 85.4

November 2003

Date Tot Prcp (mm)

11/3/2003 1

11/5/2003 0.3

11/6/2003 8.6

11/7/2003 0.3

11/12/2003 1.3

11/13/2003 0.3

11/14/2003 0.3

11/18/2003 0.5

11/20/2003 32.5

11/21/2003 12.7

11/25/2003 7.9

11/26/2003 6.1

11/28/2003 0.8

11/29/2003 33.3

11/30/2003 0.5

Total 106.4

December 2003

Date Tot Prcp (mm)

12/11/2003 6.1

12/12/2003 36.3

12/16/2003 2.3

12/17/2003 0.3

12/18/2003 39.6

12/19/2003 0.5

12/20/2003 0.8

12/21/2003 0.3

12/23/2003 5.3

12/24/2003 2.3

12/25/2003 53.1

12/26/2003 3.3

12/31/2003 1

Total 151.2