

Hudson River (HUD) NERR Meteorological Metadata

January 2003 - December 2003

Latest Update: **October 10, 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:

- i) 15-minute data are collected instantaneously for Air Temperature (C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). 15-minute Precipitation (mm) and PAR (mmol/m²) data are totaled from 5-second readings, prior to NERR_4.CSI
- ii) 15-minute average, maximum and minimum data are averages of 5-second

readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb) and Wind Speed (m/s) with NERR_4.CSI.

iii) Hourly average, maximum, and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Hourly totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

iv) Daily average, maximum and minimum data are averages of 5-second readings for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), and Wind Direction (degrees). Daily totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

Data were stored on a Campbell Scientific storage module (SM192 or SM4M), which 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/m² or less than -0.5 mmol/m²

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)(41°02'30"N 73°54'15"W), Iona Island, Rockland County (RM 45)(41°18'15"N 73°58'45"W), Tivoli Bays, Dutchess County (RM 98)(42°02'15"N 73°55'10"W), and Stockport Flats, Columbia County (RM 124)(42°02'30"N 73°46'00"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 meteorological 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: $\pm 2\%$ RH (0-90%) and $\pm 3\%$ (90-100%)

Temperature dependence of RH measurement: $\pm 0.05\%$ 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: $\pm 2\%$

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: $\pm 5\%$

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 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
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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%
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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%"
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101	4	94	400	"Air temp average in 1 hour data (.03065) is greater than 15 minute maximum (.0134) by at least 10%"
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May 2003

An anomalous 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
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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
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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
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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
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102	7	127	1900	Wind speed is less than 0.5 m/s from 7 (127) 1900 to 8 (128) 1400
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102	10	130	1900	Wind speed is less than 0.5 m/s from 10 (130) 1900 to 11 (131) 1000
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102	13	133	1800	Wind speed is less than 0.5 m/s from 13 (133) 1800 to 14 (134) 900
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102	14	134	2000	Wind speed is less than 0.5 m/s from 14 (134) 2000 to 15 (135) 900
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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%"
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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
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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
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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 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 Day Time Error Message

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 Day Time Error Message

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 utilized 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:

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

Arrays:

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