

Hudson River (HUD) NERR Meteorological Metadata
January 2004 - December 2004
Latest Update: **October 12, 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 instrument on the weather station to a Campbell Scientific CR10X datalogger. The CDMO Datalogger Program (NERR_4_1.CSI) was loaded into the CR10X, which controls the sensors and the data collection schedule (see Section 3). For data storage, the CR10X stored the data, via cable, on a Campbell Scientific SM4M storage module. The storage module was manually retrieved on a monthly basis. Using the PC208W software supplied by Campbell Scientific, the data were uploaded from the storage module and stored on a computer in comma-delimited format (.DAT). These raw data files were archived at the CDMO and at the reserve on CD-ROM. Raw data files were then opened in Microsoft Excel and pre-processed using the EQWin Format Macro developed by the CDMO. This 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 Excel file was then copied into EQWin and the data were QA/QC checked using criteria defined in Section 3 and archived in a database. Queries, reports and graphs were used to discover outliers and large changes in the data. Data that were collected and retained but considered suspect are documented in Section 11. Data that were collected but deleted are documented in Section 12. Missing data are documented in Section 13.

The Research Assistant is responsible for data entry verification.

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 the Tivoli Bays component site, and the meteorological data will help provide ancillary data. This will help us to better understand the relationships between the atmospheric conditions and aquatic environments at this site.

4. Research methods:

For routine maintenance, sensors are investigated at least once a month to ensure there is no damage or blockage to the sensors. According to Campbell Scientific, sensors are to be calibrated every two 2 years for proper data collection. After that time, the sensors are removed from the tower, and shipped to their respective manufacturers for proper and professional calibration. In order to avoid missing data, a second set of sensors is calibrated and available to be installed on the tower to continue data collection

For data collection, the CR10X datalogger is programmed to collect data in the following formats:

- i) 15-minute data are collected instantaneously for Air Temperature (oC), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction (degrees), and PAR (mmol/m²). 15-minute Precipitation (mm) data are totaled from 5-second readings.
- 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).
- 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), 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), Wind Direction (degrees). Daily totals for PAR (mmol/m²) and Precipitation (mm) are totals of 15-minute readings.

Data are stored on the Campbell Scientific SM4M storage module, which is retrieved monthly. The data are downloaded and pre-processed as described in Section 2. QA/QC of the data is conducted in EQWin. Queries are 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
- Sample not greater than 50oC or less than -30oC

Relative Humidity:

- Sample not greater than 100% or less than 0%

Pressure:

- Pressure greater than 1060 mb or less than 900 mb

Wind Speed:

- Wind speed greater than 30 m/s
- Wind speed less than 0.5 m/s for 12 consecutive hours

Wind Direction:

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

Rainfall:

- Precipitation not greater than 5 cm in 15 min

Photosynthetically Active Radiation (PAR)

- Sample not greater than 5000 mmol/m² or less than -1.0 mmol/m²

Time:

- 15-minute interval recorded

For all data:

- Duplicate data

Reports, graphs, and statistical analysis are then used to further analyze the data in EQWin.

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). A 30 foot, aluminum tower is used to elevate some of the weather monitoring equipment. The tower is on the deck of the office building, on the west side, 9 feet off the ground. The wind anemometer, wind speed, and light sensors are located at the top of the tower, 39 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 have been collected at the Field Station at Tivoli Bays since July 1999. Weather data were collected for the entire year in 2004.

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 Access data tables.

8. Associated researchers and projects:

The Hudson River NERR water quality-monitoring program examines the physical and chemical constituents of the tributary waters and the tidal waters of the freshwater tidal marshes at the Tivoli Bays component site. Measurements include seston, dissolved oxygen, alkalinity, pH, temperature, salinity, and conductivity, and

concentrations of nitrate, phosphate, sulfate, and chloride. These data are used to identify long-term trends and to determine the relationship between meteorological conditions and the 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 2004, November 2004

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 2004, November 2004

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 2004

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 2004

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 2004

Parameter: LI-COR Quantum Sensor
Units: mmol 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 µmol s⁻¹ m⁻²
Date of last calibration: May 2004

Parameter: Precipitation (specify if heated rain gauge)
Units: millimeters (mm)
Sensor type: Tipping Bucket Rain Gauge
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: June 2004

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 = hudfsmet = Field Station at Tivoli Bays

11. Data Anomalies:

Arrays:

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

January 2004

Beginning Jan. 29-30 BP values fell between 960-970 mb, these data values should be considered suspect and were left in the data set. Reason is unknown.

February 2004

On 02/03/2004 ice and snow were observed on the screen of the rain gauge. The plug was checked and the ice and snow were dumped into the funnel to test the heater. The heater was working. The cold may have overwhelmed the heater causing melting and re-freezing on the screen. Daily precipitation totals may be incorrect due to gradual melting of any snow and/or ice that accumulated in the funnel or on the screen. However, cumulative totals between these dates are correct. There was no precipitation on 02/03/04, but to preserve the cumulative total for the month, all data were left in.

March 2004

No data anomalies

April 2004

No data anomalies

May 2004

The following 15-min precipitation totals were identified as outliers. Severe thunderstorms and torrential rains occurred on these dates. The anomalous data are most likely due to these events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPrecp
hudfsmet	05/24/2004	20:30	15	05.8
hudfsmet	05/24/2004	20:45	15	05.3

hudfsmet	05/26/2004	21:45	15	13.0
hudfsmet	05/26/2004	22:00	15	07.4
hudfsmet	05/26/2004	22:15	15	05.1

The following 15-min and 60-min relative humidity readings were identified as outliers. The data appear consistent, and the cause of the anomalous readings was likely previously occurring heavy rains. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	RH
hudfsmet	05/25/2004	05:15 – 07:45	15	101
hudfsmet	05/25/2004	06:00 – 08:00	60	101
hudfsmet	05/27/2004	02:15 – 07:45	15	101
hudfsmet	05/27/2004	03:00 - 08:00	60	101

June 2004

The following 15-min and 60-min relative humidity readings were identified as outliers. The data appear consistent and the causes of the anomalous readings were likely concurrent precipitation events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	RH
hudfsmet	06/03/2004	07:15	15	101
hudfsmet	06/03/2004	07:30	15	101
hudfsmet	06/26/2004	07:00 – 09:00	60	101
hudfsmet	06/26/2004	06:45 – 08:45	15	101

July 2004

The following 15-min and 60-min relative humidity readings were identified as outliers. The data appear consistent and the causes of the anomalous readings were likely concurrent precipitation events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	RH
hudfsmet	07/02/2004	06:00 – 08:00	15	101
hudfsmet	07/06/2004	00:45 – 09:00	15	101
hudfsmet	07/06/2004	01:00 – 09:00	60	101
hudfsmet	07/19/2004	01:45 – 04:30	15	101
hudfsmet	07/19/2004	02:00 – 04:00	60	101
hudfsmet	07/27/2004	18:00 – 24:00	15	101
hudfsmet	07/27/2004	19:00 – 24:00	60	101
hudfsmet	07/28/2004	00:15 – 10:15	15	101
hudfsmet	07/28/2004	00:15 – 10:00	60	101
hudfsmet	07/29/2004	03:00 – 08:00	15	101
hudfsmet	07/29/2004	04:00 – 08:00	60	101

The following 15-min precipitation totals were identified as outliers. The anomalous data are most likely due to heavy rain events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPrep
hudfsmet	07/05/2004	19:15	15	10.2

hudfsmet	07/23/2004	13:45	15	12.4
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August 2004

The following 15-min and 60-min relative humidity readings were identified as outliers. The data appear consistent and the causes of the anomalous readings were likely concurrent precipitation events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	RH
hudfsmet	08/02/2004	02:45 – 08:30	15	101
hudfsmet	08/02/2004	04:00 – 08:00	60	101
hudfsmet	08/05/2004	01:00 - 08:30	15	101
hudfsmet	08/05/2004	02:00 – 08:00	60	101
hudfsmet	08/09/2004	01:30- 08:00	15	101
hudfsmet	08/09/2004	02:00 – 08:00	60	101
hudfsmet	08/12/2004	20:45 – 24:00	15	101
hudfsmet	08/12/2004	21:00 – 24:00	15	101
hudfsmet	08/13/2004	00:15- 09:45	15	101
hudfsmet	08/13/2004	00:15 - 09:00	60	101
hudfsmet	08/13/2004	23:15 – 24:00	15	101
hudfsmet	08/14/2004	0015 – 09:00	15	101
hudfsmet	08/14/2004	00:15– 09:00	60	101
hudfsmet	08/16/2004	05:00 – 10:45	15	101
hudfsmet	08/16/2004	06:00 – 11:00	60	101
hudfsmet	08/16/2004	20:45 – 24:00	15	101
hudfsmet	08/16/2004	21:00 – 24:00	60	101
hudfsmet	08/17/2004	00:15 - 08:45	15	101
hudfsmet	08/17/2004	00:15 - 09:00	60	101
hudfsmet	08/18/2004	06:15	15	101
hudfsmet	08/18/2004	06:30	15	101
hudfsmet	08/21/2004	02:15 – 05:30	15	101
hudfsmet	08/21/2004	03:00 – 06:00	60	101
hudfsmet	08/21/2004	13:30	15	101
hudfsmet	08/21/2004	13:45	15	101
hudfsmet	08/22/2004	04:15 – 08:00	15	101
hudfsmet	08/22/2004	05:00 – 08:00	60	101
hudfsmet	08/30/2004	20:15 – 24:00	15	101
hudfsmet	08/30/2004	21:00 – 24:00	60	101
hudfsmet	08/31/2004	00:15 - 08:30	15	101
hudfsmet	08/31/2004	00:15 - 08:00	60	101

The following 15-min precipitation totals were identified as outliers. The anomalous data are most likely due to heavy rain events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPrep
hudfsmet	08/01/2004	19:30	15	09.9
hudfsmet	08/30/2004	18:45	15	14.0

September 2004

The following 15-min precipitation totals were identified as outliers. The anomalous data are most likely due to heavy rain events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPrep
hudfsmet	09/17/2004	22:30	15	05.1

The following 15-min PAR totals were identified as outliers. The readings are within sensor specifications and occurred at night. Also, it was raining at the time. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPAR
hudfsmet	09/18/2004	02:00	15	-0001.6
hudfsmet	09/18/2004	02:15	15	-0001.8
hudfsmet	09/18/2004	02:30	15	-0001.8
hudfsmet	09/18/2004	02:45	15	-0001.8
hudfsmet	09/18/2004	03:00	15	-0001.7
hudfsmet	09/18/2004	03:15	15	-0001.4
hudfsmet	09/18/2004	03:30	15	-0001.3
hudfsmet	09/18/2004	03:45	15	-0001.1
hudfsmet	09/18/2004	04:15	15	-0001.1
hudfsmet	09/18/2004	04:30	15	-0001.3
hudfsmet	09/18/2004	04:45	15	-0001.4
hudfsmet	09/18/2004	05:00	15	-0001.5
hudfsmet	09/18/2004	05:15	15	-0001.5
hudfsmet	09/18/2004	05:30	15	-0001.3

The following 15-min and 60-min relative humidity readings were identified as outliers. The data appear consistent and the causes of the anomalous readings were likely due to concurrent precipitation events or early morning humidity . The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	RH
hudfsmet	09/08/2004	18:00 – 24:00	15	101
hudfsmet	09/08/2004	19:00 – 24:00	60	101
hudfsmet	09/09/2004	00:15 – 10:15	15	101
hudfsmet	09/09/2004	00:15 – 10:00	60	101
hudfsmet	09/11/2004	06:30	15	101
hudfsmet	09/13/2004	06:15 – 07:30	15	101
hudfsmet	09/13/2004	07:00	60	101

The aforementioned rain event on 09/17/2004 also appears to have affected the temperature readings. Erratic readings occurred beginning at 15:15 on 10/01/2004 (see Section 12). Temperature data from 23:30 on 09/17/2004 to 15:15 on 10/01/2004 were left in, but are considered suspect due to the onset of problems with the RH portion of the sensor.

October –November 2004

The temperature/RH probe was replaced on 10/07/2004 and data collection began at 08:15 on 10/08/2004. The replacement probe was a spare that had not been calibrated since 2003. Therefore, all temperature/RH data from 08:15 on 10/08/2004 until 10:00 on 11/17/2004, when a new probe was installed, are suspect.

November 2004

The following 15-min precipitation totals were identified as outliers. The anomalous data are most likely due to heavy rain events. The following data were left in:

STNCODE	SMPLDATE	SMPLTIME	CLASS	TotPrecp
hudfsmet	11/25/2004	10:30	15	07.1
hudfsmet	11/28/2004	11:30	15	06.1

December 2004

The PAR sensor began recording extremely high readings on 12/22/2004. These readings were followed by readings of –99999 on 12/23/2004. This pattern reoccurred on 12/29/2004 and 12/30/2004 and again on 12/31/2004 and 01/01/05. The problem was likely due to miscommunication between the PAR sensor and the CR10X caused by corrosion on the wires. Data that were obviously abnormal or –99999 were deleted (see Section 12). The following data appear reasonable, but were recorded during the time period that the PAR sensor appeared to be miscommunicating with the CR10X. The data were left in, but are suspect.

STNCODE	SMPLDATE	SMPLTIME	SMPLDATE	SMPLTIME	CLASS
hudfsmet	12/22/2004	18:15 -	12/23/2004	11:15	15 and 60
hudfsmet	12/24/2004	23:15 – 24:00			15
hudfsmet	12/24/2004	00:15 -	12/29/2004	11:15	15 and 60
hudfsmet	12/30/2004	01:15 – 09:30			15 and 60
hudfsmet	12/30/2004	20:15 – 24:00			15 and 60
hudfsmet	12/31/2004	00:15 – 10:30			15 and 60
hudfsmet	12/31/2004	14:15 – 24:00			15 and 60
hudfsmet	12/25/2004	00:15 -	12/29/2004	00:00	144

On 02/07/2005 it was discovered that the circuit breaker on the outlet for the rain gauge heater had been tripped. It is unknown how long the heater had been inactive. The temperature did not fall below freezing for an extended period of time before 12/14/2004. There was a significant rain event on 12/23/2004. Therefore, if the heater was not working, daily precipitation totals between 12/14/2004 and 12/23/2004 and daily precipitation totals between 12/24/2004 and 01/01/2005 may be incorrect due to gradual melting of any snow and/or ice that accumulated in the funnel or on the screen. However, cumulative totals between these dates are correct. All data were left in.

12. Deleted Data

Arrays:

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

March 2004

At 10:50 on 03/10/04 an updated program was loaded onto the CR10X (see Section 14). Hourly averages and max/min data (Array 60) at 11:00 on 03/10/04 and daily averages and max/min data (Array 144) at 24:00 on 3/10/04 were deleted due to loss of 5-second data used to calculate these averages.

May 2004

The weather station was shut down for maintenance at 07:43 on 05/11/2004 (see Section 13) and after power was restored, data collection resumed at 10:45 on 05/11/2004. Therefore, hourly averages (Array 60) and max/min data (Array 15, 60) at 11:00 on 05/11/2004 were deleted due to loss of 5-second data used to calculate these numbers.

Data collection was restored at 10:45 on 05/11/2004, but the newly calibrated barometric pressure sensor was not installed correctly. The problem was discovered and fixed at 12:15 on 05/11/2004. All barometric pressure data were deleted from 10:45 through 12:15 on 05/11/2004. Hourly average and max/min barometric pressure data (Array 60) at 13:00 on 05/11/2004 were deleted due to loss of 5-second data used to calculate these numbers.

Data collection was restored at 10:45 on 05/11/2004, but the multiplier for the LI-COR sensor was not changed until an updated program (see Section 14) was loaded onto the CR10X at 11:30 on 05/11/2004. Therefore, all PAR data were deleted from 10:45 through 11:30 on 05/11/2004.

The updated program (see Section 14) was loaded onto the CR10X at 11:30 on 05/11/2004. Therefore, hourly averages and max/min data (Array 60) at 12:00 on 05/11/2004 were deleted due to loss of 5-second data used to calculate these numbers.

Daily averages and max/min data (Array 144) at 24:00 on 05/11/2004 were deleted (all parameters) due to the loss of 5-second data used to calculate these averages, which occurred after the updated program was loaded onto the CR10X.

September – October 2004

On 9/17/2004 at 23:30 the RH reading was –99999. Erratic readings and readings of –99999 continued until the problem was discovered at 14:00 on 10/07/2004. The RH probe appears to have failed as a result of an extremely heavy rain event on 09/17/2004. All RH data were deleted from 21:15 on 09/17/2004 to 14:00 on 10/07/2004.

Temperature readings became erratic on 10/01/2004, random temperature readings of 30-40oC began to occur at 15:15. The spikes became more frequent between 10/01/2004 and 10/07/2004, when the problem was discovered, and ranged from 50oC to 90oC. All temperature data were deleted from 15:15 on 10/01/2004 to 14:00 on 10/07/2004.

The temperature/RH probe was replaced with a spare on 10/07/2004 and data collection began at 08:30 on 10/08/2004. Hourly averages and max/min data (Array 60) at 09:00 on 10/08/2004 and daily averages and max/min data (Array 144) at 24:00 on 10/08/2004 were deleted (all parameters) due to loss of 5-second data prior to 08:15 on 10/08/2004.

Due to a possible programming or operator error (cause unknown) Battery Voltage (avgvolt) data was not recorded from 10/08/2004 at 08:30 until 12/09/2004 at 11:15.

November 2004

The temperature/RH probe was replaced with a new probe on 11/17/2004. All temperature and RH data were deleted while the replacement was occurring from 10:30-11:00 on 11/17/2004. Daily averages and max/min temperature and RH data (Array 144) at 24:00 on 11/17/2004 were deleted due to the probe replacement.

December 2004

The PAR sensor began recording extremely high readings on 12/22/2004. These readings were followed by readings of –99999 on 12/23/2004. This pattern reoccurred on 12/29/2004 and 12/30/2004 and again on 12/31/2004 and 01/01/05. The problem was likely due to miscommunication between the PAR sensor and the CR10X caused by corrosion on the wires. The following data were deleted:

STNCODE	SMPLDATE	SMPLTIME	CLASS
hudfsmet	12/22/2004	15:00 – 18:00	15 and 60
hudfsmet	12/22/2004	24:00	144
hudfsmet	12/23/2004	11:30 – 23:00	15 and 60
hudfsmet	12/23/2004	24:00	144
hudfsmet	12/29/2004	11:30 – 23:45	15 and 60
hudfsmet	12/29/2004	24:00	144
hudfsmet	12/30/2004	00:15 - 01:00	15 and 60
hudfsmet	12/30/2004	09:45 – 20:00	15 and 60
hudfsmet	12/30/2004	24:00	144
hudfsmet	12/31/2005	10:45 – 14:00	15 and 60

13. Missing Data

Arrays:

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

May 2004

The weather station was shut down at 07:43 on 05/11/2004 in order to replace the existing sensors with newly calibrated sensors. Data (all parameters) are missing from 07:45 through 10:30 on 05/11/2004. Data collection resumed at 10:45 on 05/11/2004.

An updated program (see Section 14) was loaded onto the CR10X at 11:30 on 05/11/2004. Therefore, data (all parameters) were not collected at 11:30 on 05/11/2004.

October 2004

The weather station was shut down at 14:10 on 10/07/04 in order to replace the temperature/RH probe. This cleared the program from the CR10X. The program was reloaded at 08:30 on 10/08/04. Therefore data (all parameters) are missing from 14:15 on 10/07/04 until 08:30 on 10/08/04.

14. Other Remarks/Notes

On 10/12/2023 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.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 throughout early 2023.

At 10:50 on 03/10/04 an updated program (NERR_4_1.CSI) was loaded onto the CR10X to convert the midnight time stamp from 24:00 to 00:00.

The sensors for temperature/relative humidity, barometric pressure, LI-COR, wind speed and wind direction were replaced with manufacturer-calibrated sensors on 05/11/2004.

The weather program NERR_4_1.CSI was updated with the multiplier for the newly calibrated LI-COR sensor and uploaded to the CR10X at 11:30 on 05/11/2004

The rain gauge was calibrated on 06/04/2004. There was no precipitation during calibration. Any false readings caused by tipping the buckets were changed to zero.