Weeks Bay (WKB) NERR Meteorological Metadata
January – December 2003
First submission: 03/30/04
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I. Data Set & Research Descriptors

1) Principal investigator & contact persons:

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2) Entry verification

a) Data Input Procedures:
The 15-minute, 1-hour average, and 24-hour data were downloaded from each instrument on the weather station to a Campbell Scientific CR10X datalogger. The CDMO Data Logger Program (nerr3.csi) was loaded into the CR10X and controls the sensors and data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The CR10X then interfaced with the Campbell SM192 memory module for long-term data storage.

From January through December 2003 Campbell PC208W software was used to automatically dial up the weather station via a Campbell Com200 modem and upload data at five-minute intervals. The uploaded raw data (none QA/QC'd) was periodically transferred to a separate file for archival and future QA/QC purposes.

From January through November 19th Real time data management (RTDM) software produced joint photographic experts group (JPEG) image files displaying weather conditions at time of collection. The JPEG image files were exported to a network server maintained by Faulkner Community College in Fairhope, Al. and were available for viewing using an Internet connection.

On November 19th the CR10X program was updated to match the requirements of the EQWin database software program, which will be employed at all NERR sites and replaces the WDMP. At this time a station identification number (711) was also introduced within the CR10X program. The identification number allows a Dauphin Island Sea Lab computer to remotely dial up and identify the Weeks Bay NERR weather station. The data generated from the weather station is converted to graphic representation and posted on the internet at

http://cast-net.mobilebaynep.com/monitoringdata/default.asp

At the end of the year monthly data files were compiled. From the dates of January 1st through November 19th (Julian day 323) the CDMO Weather Data Management Program (WDMP) was used to convert the files to an Access database. The WDMP program was developed in Visual Basic to interface with the NERRS data collection schedule (see 2b of the Entry Verification section for the data collection schedule). The WDMP will automatically input and convert the monthly raw data file into an Access database. There are three main steps the WDMP performs. First, it converts the comma delimited monthly raw data file into an Access Database. Secondly, it checks the data against a predetermined set of error criteria (see Part C of this section). Finally, it produces error and summary reports. Any anomalous data were investigated and are noted below in Anomalous Data section. Any data corrections that were performed are noted in the Missing/Deleted Data section below. From November 19 1200 to the end of the year, compiled data files were opened in Microsoft excel for pre-processing with the EQWin format macro that was developed by the CDMO to insert a date column (mm/dd/yyyy), insert station codes, correct the time column format, and reformat the data to the appropriate number of decimal places. The pre-processed file was then copied into an EQWin weather.eqi file where the data was QA/QC checked and archived into a database. EQWin queries, reports and graphs are used to discover data set outliers (values which fall outside the range that the instrument is designed to measure) and large changes in the data. EQWin is also used to generate statistics, view graphs, create customized queries and finally export the data to the CDMO. Any anomalous data are investigated and noted below is the Anomalous/Suspect Data Section. Any data corrections that were performed are noted in the Deleted Data Section. Missing data due to probe failure or other reason are noted in the missing data section.

The Centralized Data Management Office converted all SWMP weather data collected with CR10X program versions prior to version 4.0 which was distributed in October 2003. This was necessary in order to merge the old data format (12 array output) with the new data format found in version 4.0 (3 array output). The new format produces averages, maximums and minimums every fifteen minutes (array 15), every hour (array 60) and every day (array 144) for any sensors hooked up to the CR10X. Specifically, the 150 and 151 fifteen minute data were converted to the new 15 array; the hourly 101, 102, 105 and 106 data were converted to the new 60 array; and the daily 241, 242, 243, 244, 245 and 246 data were converted to the new 144 array. With the new format, the use of 55555's to code for deleted data and 11111's to code for missing data has been abandoned. Hence, all 55555's or 11111's contained in the SWMP weather data collected prior to Version 4.0 of the CR10X program were removed and left blank.

b) Data Collection Schedule

i) Data is collected in the following formats.
(1) Sample data points are collected every 15 minutes.
(2) Hourly averages are collected every 60 minutes.
(3) Daily average, maximum with time, and minimum with time.

ii) 15 minute sample point parameters: Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, Rainfall (mm)

iii) Hourly average parameters: Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, Wind Direction Standard Deviation (using Yamartino's Algorithm)

iv) Daily Averages parameters: Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction

v) Daily Maximum parameters: Date, Time, Air Temperature (c), Time, Relative Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time, Wind Speed (m/s), Time, Battery Voltage, Time

vi) Daily Minimum parameters: Date, Time, Air Temperature (c), Time, Relative Humidity (%), Time, LiCor (par), Time, Barometric Pressure (mb), Time, Wind Speed (m/s), Time, Battery Voltage, Time

c) Error/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
- Max and min temp recorded for the day
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour

Relative Humidity:
- Not changed by more than 25% from the previous 15 minutes
- Max and min humidity recorded for the day
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour

Rainfall:
- Precipitation not greater than 5 mm in 15 min
- No precipitation for the month

Wind Speed:
- Wind speed greater than 30 m/s
- Wind speed less than .5 m/s

Wind Direction:
- Wind direction not greater than 360 degrees
- Wind direction not less than 0 degrees

Pressure:
- Pressure greater than 1040 mb or less than 980 mb
- Pressure changes greater than 5 mb per hour
- Maximum and minimum values recorded for the day
- 1-hour average not greater than 10% above the greatest 15 min sample recorded in the hour

Time:
- 15-minute interval recorded

For all data:
- Duplicate interval data

3) Research objectives:

The principle objective is to record long-term meteorological data for Weeks Bay in order to 1)observe any environmental changes or trends over time, 2) use as a reference for research projects at the reserve, and 3) give meteorological context to our half-hour SWMP water quality data.

4) Research methods:

The Campbell Scientific weather station samples every 5 seconds to produce hourly averages for arrays 101 and 102 (array 60 after 11/19) and daily averages, maximums and minimums for arrays 241,242 and 243 (array 144 after 11/19). Parameters measured are air temperature, relative humidity, barometric pressure, rainfall, wind speed and wind direction. An instantaneous sample is taken every 15 minutes and assigned to array 150 (array 15 after 11/19). Periodically, sensors on the weather station are inspected for damage or debris. If any is found, it is repaired and/or cleaned. Sensors are removed and calibrated on an annual or bi-annual basis. The sensors and tower were obtained in the fall of 1996. However the sensors were not installed until the fall of 1998. Sensors were last calibrated in 2003. There were no other analyses done on the meteorological data at present.

5) Site location and character:

The Weeks Bay National Estuarine Research Reserve is located near the Gulf coast, southeast of the city of Fairhope, Alabama. Weeks Bay (30deg 23' N, 87deg 50' W) is a small, shallow, microtidal sub-estuary, located on the eastern shore of Mobile Bay in the northern Gulf of Mexico. The bay is nearly diamond shaped, and its longitudinal axis (3.4 km long) runs nearly north-south from the head, where the Fish River flows in, to the mouth, where water is exchanged with Mobile Bay. Its widest point (3.1 km) is located near the center of the estuary, where the Magnolia River discharges into eastern side of Weeks Bay. Average depth is 1.4 m, although there are two areas where depths are significantly greater. The first is in the mouth of the bay, where the average depth is 6 m; the second is about 100 m upstream of the mouth of the Fish River, where the average depth is 3.5 m. Tides are principally diurnal, and have a mean range of 0.4 m.

The Fish River drainage basin encompasses 14300 hectares and contributes approximately 73% to the total incoming freshwater flow with the Magnolia River supplying the rest. Mean combined discharge is 9 cubic meters per second; although freshets up to 4 times larger occur throughout the year. These characteristics result in a freshwater residence time of 13 days under average discharge conditions, with a range from 0.5 to 100 days. Salinity in Weeks Bay varies substantially both temporally and spatially. During periods of high flow in the river, salinity in the bay may be fresh from the head to the mouth, except in

the deeper holes of the estuary that are not as easily flushed. However, during periods of low flow in the river, wind velocity and tidal stage are strong factors influencing salinity structure. Salinity greater than 25 ppt is infrequently observed in Weeks Bay and is usually restricted to the southern portion of the estuary near the mouth.

The weather station is located on a reserve owned pier (lat 30deg 24.89'N, long 87deg 49.56'W) just south of the highway 98 bridge, on the west side of the mouth of the Fish River. Wind sentry, tipping bucket rain gauge, temperature/RH probe, and barometric pressure sensor are mounted along an aluminum tower between 4.8 and 7.6 meters above water surface. LI-COR quantum sensor was not deployed in 2001. Approximately 100 meters upstream is an YSI datalogger deployment site for the continuous monitoring of water quality.

6) Data collection period:

Weather data has been collected from January 1, 2001 through December 31, 2003. This metadata is applicable only to data collected from January 1, 2003 through December 31, 2003.

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 Access data tables.

8) Associated researchers and projects:

The Geological Survey of Alabama, in cooperation with the United States Geological Survey, maintains two rain gauges within the Weeks Bay watershed. One is located at the highway 98 Magnolia River overpass; the other is located at the highway 104 Fish River overpass.

The following researchers have directly requested and received meteorological data generated from the Weeks Bay weather station for use as either primary or ancillary information significant to their respective projects.

Mastioff, Gerald. Case Western Reserve University. Erosion and transport of fine sediments from watersheds tributary to NERR estuaries.

Chin, Yu-Ping. Ohio State University. Distribution and phototransformation of non-point source agricultural pesticides in freshwater and marine NERR wetlands.

Caffrey, Jane. University of West Florida. Modeling estuarine ecosystem trophic status using continuous nitrate and water quality data.

Landers, Stephen. Troy State University. Environmental factors affecting the distribution and abundance of the benthic protozoological assemblages in Weeks Bay NERR.

Wilson, Chris. Case Western Reserve University. The movement of sediment and radionuclide through Weeks Bay NERR.

II. Physical Structure Descriptors

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

Parameter: Photosynthetically Active Radiation (PAR)
Units: micro-moles per square meter
Sensor type: Li-Cor Quantum Sensor
Model # LI190SB High stability silicon photovoltaic detector (blue enhanced)
Stability: <±2% change over 1 yr
Operating Temperature: -40 to 65°C
Sensitivity: typically 5 µA per 1000µmoles s-1 m-2
Light spectrum wavelength: 400 to 700 nm
Calibration dates: 04/18/03

Parameters: Wind Speed and Wind Direction
Units: Wind speed - meter per second (m/s); Wind direction – degrees (°)
Sensor type: Campbell Scientific Wind Sentry Set
Model # 03001
Range: 0-50 m/s; 360° mechanical
Date of last calibration: 04/18/03

Parameters: Temperature and Relative Humidity (up to 04/18/03)
Units: Celsius for temperature and percent for relative humidity
Sensor type: Campbell Scientific
Model #: HMP35C
Operating Temperature: -20-+60°C
Temperature Measurement Range: -35-+50°C
Temperature Accuracy: ± 0.4 °C over range of -24° to 48°C; ±0.9 over range of -38° to 53°
Relative Humidity Measurement Range: 0-100% non-condensing
RH Accuracy: +/-2% RH (0-90%) and +/-3%(90-100%)
Date of Last calibration: New HMP45C installed on 04/18/03

Parameters: Temperature and Relative Humidity (post 04/18/03)
Units: Celsius for temperature and percent for relative humidity
Sensor type: Campbell Scientific
Model #: HMP45C
Operating Temperature: -40-+60°C
Temperature Measurement Range: -40 to +60°C
Temperature Accuracy: ± 0.2 °C @ 20°C
Relative Humidity Measurement Range: 0-100% non-condensing
RH Accuracy: at 20°C: +/- 2% RH(0-90%) and +/-3% (90-100%)
Temperature dependence of RH measurement: +/- 0.05%RH/°C

Parameter: Barometric Pressure
Units: millibars (mb)
Sensor type: Campbell Scientific Analog Barometer
Model # CS-105
Operating Range: Pressure – 600-1060 mb
Temperature: -40-+60C
Humidity: non-condensing
Accuracy: ±0.5 to 6.0 mb (+20-60C)
Stability: ± 0.1 mb per year
Date of Last calibration: New as of 04/18/03

Parameter: Precipitation
Units: millimeters (mm)
Sensor type: Tipping Bucket Rain Gauge
Model #: TE 525
Range: 0.1 mm
Accuracy: 1.0% at <2"/hr
Date of Last calibration: 04/18/03

10) Coded variable indicator and variable code definitions:

wkbwbmet = weeks bay weather station

11) Anomalous/Suspect 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.

General comments:
1. Rainfall differences of over 5mm between 15 minute samples can occur during heavy rains and are common to this site.
2. Relative humidity differences greater than 25% between 15minute samples are not unusual with frontal passages and are usually associated with wind shifts.
3. Air temp differences between 15minute samples greater than 3 degrees are not unusual with frontal passages and are usually associated with wind shifts.
4. Wind speed of less than 0.5m/s are not uncommon for this site.
5. Relative humidity at or near 100% can occur at this site. Reported values up to 103% are within the accuracy range of sensor.

January 2003: None

February 2003
The following data appear to be correct:

Array	Date	Day	Time	Error message
150	5	36	1615	Rel hum difference from 5 (36) 1615 (30.724) to 5 (36) 1630 (56.753) is greater than 25%
151	16	47	145	Precip difference from 16 (47) 145 (5.588) to 16 (47) 200 (.254) is greater than 5 mm
151	21	52	1000	Precip difference from 21 (52) 1000 (.254) to 21 (52) 1015 (6.858) is greater than 5 mm
151	21	52	1500	Precip difference from 21 (52) 1500 (2.286) to 21 (52) 1515 (16.764) is greater than 5 mm
151	21	52	1515	Precip difference from 21 (52) 1515 (16.764) to 21 (52) 1530 (5.842) is greater than 5 mm
151	21	52	1630	Precip difference from 21 (52) 1630 (7.874) to 21 (52) 1645 (1.524) is greater than 5 mm

151 26 57 1815 Precip difference from 26 (57) 1815 (.254) to 26 (57) 1830 (7.366) is greater than 5 mm

March 2003
The following data appear to be correct:
Array Date Day Time Error message
150 29 88 230 Air temp difference from 29 (88) 230 (17.616) to 29 (88) 245 (20.769) is greater than 3.0 degrees C

April 2003
The following data appear to be correct:
Array Date Day Time Error message
150 13 103 1045 Air temp difference from 13 (103) 1045 (26.154) to 13 (103) 1100 (22.266) is greater than 3.0 degrees C

150 18 108 1115 Rel hum difference from 18 (108) 1115 (39.605) to 18 (108) 1130 (69.493) is greater than 25%

151 21 111 845 Precip difference from 21 (111) 845 (.762) to 21 (111) 900 (6.858) is greater than 5 mm

151 21 111 900 Precip difference from 21 (111) 900 (6.858) to 21 (111) 915 (.254) is greater than 5 mm

May 2003
The following data appear to be correct:
Array Date Day Time Error message
150 3 123 1200 Air temp difference from 3 (123) 1200 (26.544) to 3 (123) 1215 (22.456) is greater than 3.0 degrees C

150 13 133 1430 Air temp difference from 13 (133) 1430 (25.801) to 13 (133) 1445 (22.788) is greater than 3.0 degrees C

150 13 133 1430 Rel hum difference from 13 (133) 1430 (43.353) to 13 (133) 1445 (69.825) is greater than 25%

151 19 139 530 Precip difference from 19 (139) 530 (1.016) to 19 (139) 545 (8.128) is greater than 5 mm

151 19 139 600 Precip difference from 19 (139) 600 (10.414) to 19 (139) 615 (2.794) is greater than 5 mm

151 20 140 1915 Precip difference from 20 (140) 1915 (.254) to 20 (140) 1930 (8.89) is greater than 5 mm

June 2003
The following data appear to be correct:

Array	Date	Day	Time	Error message
150	3	154	45	Air temp difference from 3 (154) 45 (25.281) to 3 (154) 100 (21.729) is greater than 3.0 degrees C
150	11	162	1300	Air temp difference from 11 (162) 1300 (26.329) to 11 (162) 1315 (23.316) is greater than 3.0 degrees C
150	22	173	1415	Air temp difference from 22 (173) 1415 (28.27) to 22 (173) 1430 (24.92) is greater than 3.0 degrees C
151	6	157	415	Precip difference from 6 (157) 415 (2.286) to 6 (157) 430 (11.176) is greater than 5 mm
151	6	157	430	Precip difference from 6 (157) 430 (11.176) to 6 (157) 445 (4.064) is greater than 5 mm
151	6	157	915	Precip difference from 6 (157) 915 (.254) to 6 (157) 930 (6.096) is greater than 5 mm
151	6	157	1130	Precip difference from 6 (157) 1130 (7.112) to 6 (157) 1145 (1.27) is greater than 5 mm
151	8	159	545	Precip difference from 8 (159) 545 (.508) to 8 (159) 600 (5.588) is greater than 5 mm
151	8	159	600	Precip difference from 8 (159) 600 (5.588) to 8 (159) 615 (.508) is greater than 5 mm
151	13	164	2330	Precip difference from 13 (164) 2330 (7.366) to 13 (164) 2345 (.254) is greater than 5 mm
151	20	171	330	Precip difference from 20 (171) 330 (.254) to 20 (171) 345 (9.398) is greater than 5 mm
151	21	172	700	Precip difference from 21 (172) 700 (3.302) to 21 (172) 715 (9.906) is greater than 5 mm
151	21	172	715	Precip difference from 21 (172) 715 (9.906) to 21 (172) 730 (1.778) is greater than 5 mm
151	21	172	1500	Precip difference from 21 (172) 1500 (.254) to 21 (172) 1515 (5.842) is greater than 5 mm
151	21	172	2245	Precip difference from 21 (172) 2245 (3.302) to 21 (172) 2300 (10.16) is greater than 5 mm
151	21	172	2300	Precip difference from 21 (172) 2300 (10.16) to 21 (172) 2315 (2.032) is greater than 5 mm

151 30 181 1615 Precip difference from 30 (181) 1615 (1.778) to 30 (181) 1630 (9.652) is greater than 5 mm

July 2003
The following data appear to be correct:

Array	Date	Day	Time	Error message
150	17	198	1430	Air temp difference from 17 (198) 1430 (28.398) to 17 (198) 1445 (24.185) is greater than 3.0 degrees C
150	22	203	1745	Air temp difference from 22 (203) 1745 (29.012) to 22 (203) 1800 (25.396) is greater than 3.0 degrees C
150	25	206	1530	Air temp difference from 25 (206) 1530 (27.535) to 25 (206) 1545 (23.985) is greater than 3.0 degrees C
150	31	212	1700	Air temp difference from 31 (212) 1700 (29.603) to 31 (212) 1715 (25.383) is greater than 3.0 degrees C
151	1	182	100	Precip difference from 1 (182) 100 (3.81) to 1 (182) 115 (16.51) is greater than 5 mm
151	1	182	115	Precip difference from 1 (182) 115 (16.51) to 1 (182) 130 (5.588) is greater than 5 mm
151	5	186	1900	Precip difference from 5 (186) 1900 (7.874) to 5 (186) 1915 (.762) is greater than 5 mm
151	14	195	1145	Precip difference from 14 (195) 1145 (6.35) to 14 (195) 1200 (13.462) is greater than 5 mm
151	14	195	1215	Precip difference from 14 (195) 1215 (9.652) to 14 (195) 1230 (3.302) is greater than 5 mm
151	17	198	1445	Precip difference from 17 (198) 1445 (.254) to 17 (198) 1500 (6.35) is greater than 5 mm
151	21	202	1030	Precip difference from 21 (202) 1030 (2.032) to 21 (202) 1045 (7.112) is greater than 5 mm
151	21	202	1045	Precip difference from 21 (202) 1045 (7.112) to 21 (202) 1100 (1.524) is greater than 5 mm
151	22	203	1915	Precip difference from 22 (203) 1915 (9.906) to 22 (203) 1930 (4.572) is greater than 5 mm

151 23 204 500 Precip difference from 23 (204) 500 (1.016) to 23 (204) 515 (13.716) is greater than 5 mm

151 23 204 515 Precip difference from 23 (204) 515 (13.716) to 23 (204) 530 (5.588) is greater than 5 mm

102 11 192 2000 Wind speed is less than 0.5 m/s from 11 (192) 2000 to 12 (193) 1200

102 12 193 2100 Wind speed is less than 0.5 m/s from 12 (193) 2100 to 13 (194) 900

102 15 196 1900 Wind speed is less than 0.5 m/s from 15 (196) 1900 to 16 (197) 800

August 2003
The following data appear to be correct:
Array Date Day Time Error message
150 6 218 1030 Air temp difference from 6 (218) 1030 (27.668) to 6 (218) 1045 (24.256) is greater than 3.0 degrees C

150 20 232 1200 Air temp difference from 20 (232) 1200 (28.598) to 20 (232) 1215 (24.985) is greater than 3.0 degrees C

150 20 232 1515 Air temp difference from 20 (232) 1515 (27.091) to 20 (232) 1530 (23.941) is greater than 3.0 degrees C

150 30 242 1145 Air temp difference from 30 (242) 1145 (29.737) to 30 (242) 1200 (26.455) is greater than 3.0 degrees C

151 1 213 130 Precip difference from 1 (213) 130 (6.096) to 1 (213) 145 (.508) is greater than 5 mm

151 1 213 215 Precip difference from 1 (213) 215 (7.366) to 1 (213) 230 (1.778) is greater than 5 mm

151 6 218 1030 Precip difference from 6 (218) 1030 (.508) to 6 (218) 1045 (8.382) is greater than 5 mm

151 13 225 30 Precip difference from 13 (225) 30 (2.032) to 13 (225) 45 (11.938) is greater than 5 mm

151 13 225 45 Precip difference from 13 (225) 45 (11.938) to 13 (225) 100 (1.016) is greater than 5 mm

151 19 231 1345 Precip difference from 19 (231) 1345 (.254) to 19 (231) 1400 (8.89) is greater than 5 mm

151 19 231 1400 Precip difference from 19 (231) 1400 (8.89) to 19 (231) 1415 (.508) is greater than 5 mm

151 20 232 1315 Precip difference from 20 (232) 1315 (9.906) to 20 (232) 1330 (3.302) is greater than 5 mm

102 5 217 1800 Wind speed is less than 0.5 m/s from 5 (217) 1800 to 6 (218) 800

102 7 219 1900 Wind speed is less than 0.5 m/s from 7 (219) 1900 to 8 (220) 700

102 11 223 2000 Wind speed is less than 0.5 m/s from 11 (223) 2000 to 12 (224) 800

September 2003
The following data appear to be correct:
Array Date Day Time Error message
150 5 248 1515 Air temp difference from 5 (248) 1515 (28.801) to 5 (248) 1530 (25.787) is greater than 3.0 degrees C

151 13 256 1845 Precip difference from 13 (256) 1845 (9.398) to 13 (256) 1900 (14.986) is greater than 5 mm

151 13 256 1900 Precip difference from 13 (256) 1900 (14.986) to 13 (256) 1915 (.508) is greater than 5 mm

October 2003
The following data appear to be correct:
150 21 294 1230 Air temp difference from 21 (294) 1230 (26.941) to 21 (294) 1245 (23.922) is greater than 3.0 degrees C

150 22 295 1230 Air temp difference from 22 (295) 1230 (28.074) to 22 (295) 1245 (24.523) is greater than 3.0 degrees C

151 26 299 530 Precip difference from 26 (299) 530 (7.62) to 26 (299) 545 (1.27) is greater than 5 mm

102 4 277 1900 Wind speed is less than 0.5 m/s from 4 (277) 1900 to 5 (278) 700

102 5 278 1900 Wind speed is less than 0.5 m/s from 5 (278) 1900 to 6 (279) 800

102 13 286 1800 Wind speed is less than 0.5 m/s from 13 (286) 1800 to 14 (287) 700

102 19 292 1800 Wind speed is less than 0.5 m/s from 19 (292) 1800 to 20 (293) 700

102 20 293 1900 Wind speed is less than 0.5 m/s from 20 (293) 1900 to 21 (294) 800

102 23 296 1900 Wind speed is less than 0.5 m/s from 23 (296) 1900 to 24 (297) 900

102 28 301 1900 Wind speed is less than 0.5 m/s from 28 (301) 1900 to 29 (302) 800

November 2003
The following data appear to be correct:

Array	Date	Day	Time	Error message
151	18	322	615	Precip difference from 18 (322) 615 (.254) to 18 (322) 630 (7.62) is greater than 5 mm
151	18	322	630	Precip difference from 18 (322) 630 (7.62) to 18 (322) 645 .254) is greater than 5 mm
102	2	306	1700	Wind speed is less than 0.5 m/s from 2 (306) 1700 to 3 (307) 700
102	11	315	1900	Wind speed is less than 0.5 m/s from 11 (315) 1900 to 12 (316) 900
102	15	319	1800	Wind speed is less than 0.5 m/s from 15 (319) 1800 to 16 (320) 900

Precipitation

Date	time	mm
11/23	23:30	6.1
11/27	19:45	5.8

December 2003

The following data appear to be correct:
Precipitation (see comment

Date	time	mm
12/03	18:00	5.6
12/03	18:15	5.3
12/03	18:30	5.1
12/13	12:15	8.6
12/29	16:30	8.6

Relative humidity

Date	time	mm
12/15	01:15	
12/15	01:30	
12/15	01:45	
12/15	02:00	
12/15	02:15	
12/15	02:30	
12/15	02:45	
12/15	03:00	
12/15	03:15	
12/15	03:30	
12/15	06:15	

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.

January 2003:

Hourly averages at 1600 hours on the 24th and daily averages for the 24th were erroneous due to incomplete records for those days. LiCor (par) values were erroneous due to probe malfunction. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	24	24	1530	Technician changed 150 Array data at 24 (24) 1530 to 31 (31) 2400
241	24	24	2400	Technician changed 241 Array from 24 (24) 2400 to 24 (24) 2400
242	24	24	2400	Technician changed 242 Array from 24 (24) 2400 to 24 (24) 2400
243	24	24	2400	Technician changed 243 Array data from 24 (24) 2400 to 30 (30) 2400
244	24	24	2400	Technician changed 244 Array data from 24 (24) 2400 to 24 (24) 2400
244	31	31	2400	Technician changed 244 Array data at 31 (31) 2400 to 31 (31) 2400

February 2003:
LiCor (par) values were erroneous for the entire month due to malfunctioning probe. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	1	32	15	Technician changed 150 Array data at 1 (32) 15 to 28 (59) 2400
243	1	32	2400	Technician changed 243 Array data at 1 (32) 2400 to 28 (59) 2400
244	1	32	2400	Technician changed 244 Array data at 1 (32) 2400 to 28 (59) 2400

March 2003:
LiCor (par) values were erroneous for the entire month due to malfunctioning probe. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message

150	1	60	15	Technician changed 150 Array data at 1 (60) 15 to 31 (90) 2400
243	1	60	2400	Technician changed 243 Array data at 1 (60) 2400 to 31 (90) 2400
244	1	60	2400	Technician changed 244 Array data at 1 (60) 2400 to 31 (90) 2400

April 2003:
LiCor (par) values up to the installation of a repaired and calibrated probe on 04/18/03 (day 108) at 1430 were erroneous due to a malfunctioning probe. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	1	91	15	Technician changed 150 Array data from 1 (91) 15 to 18 (108) 1415
243	1	91	2400	Technician changed 243 Array data from 1 (91) 2400 to 18 (108) 2400
244	1	91	2400	Technician changed 244 Array data from 1 (91) 2400 to 18 (108) 2400
243	19	109	2400	Technician changed 244 Array data (minimum temp) an erroneous MinTemp outlier of -40 C was recorded for an unknown reason, outlier was deleted from data

Deleted all values from 4/18 1400-4/19 1430 plus the 60 array 4/19 1500 and 144 4/19 2400 data due to possible sensor malfunction affecting BP and RH.

May 2003: None

June 2003: None

July 2003: None

August 2003:
LiCor (par) values from 08/06 00:15 to end of month were erroneous due to a malfunctioning probe. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	6	218	15	Technician changed 150 Array data at 6 (218) 15 to 31 (243) 2400
243	6	218	2400	Technician changed 243 Array data at 6 (218) 2400 to 31 (243) 2400
244	6	218	2400	Technician changed 244 Array data at 6 (218) 2400 to 31 (243) 2400

September 2003:
LiCor (par) values for entire month were erroneous due to a malfunctioning probe. Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	1	244	15	Technician changed 150 Array data at 1 (244) 15 to 30 (273) 2400
243	1	244	2400	Technician changed 243 Array data at 1 (244) 2400 to 30 (273) 2400
244	1	244	2400	Technician changed 244 Array data at 1 (244) 2400 to 30 (273) 2400

October 2003:
LiCor (par) values for entire month were erroneous due to a malfunctioning probe.
Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	1	274	15	Technician changed 150 Array data at 1 (274) 15 to 31 (304) 2400
243	1	274	2400	Technician changed 243 Array data at 1 (274) 2400 to 31 (304) 2400
244	1	274	2400	Technician changed 244 Array data at 1 (274) 2400 to 31 (304) 2400

November 2003:
LiCor (par) values for the entire month were erroneous due to a malfunctioning probe.
Technician eliminated the original data and replaced with code 55555, indicating to WDMP program that values were altered by user.

Array	Date	Day	Time	Error message
150	1	305	15	Technician changed 150 Array data from 1 (305) 15 to 19 (323) 15
243	1	305	2400	Technician changed 243 Array data from 1 (305) 2400 to 18 (322) 2400
244	1	305	2400	Technician changed 244 Array data from 1 (305) 2400 to 18 (322) 2400

The Weather Station was powered down on 11/19/2003 to load the new CR10X program (NERR4.csi) as a result data were lost so the daily averages for 11/19/2003 were deleted.

STNCODE	SMPLDATE	USRCODES	SMPLTIME	CLASS
wkbwbmet	11/20/2003	324	00:00	144 Daily Average/Max/Min

December 2003:

LiCor (par) values for the entire month were erroneous due to a malfunctioning probe.
Data deleted from record.

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.

January 2003
All data are missing up to 15:30 on the 24th due to internal battery failure of the SM192 memory module. Upon upload of memory module technician was unable to accurately identify dates associated with data arrays.
Time values for the following maximum and minimum battery voltages were unrecorded, reason unknown.

Array	Date		Day	Time	Error message
243	31	31	2400		Too few fields in record
244	25	25	2400		Too few fields in record
244	26	26	2400		Too few fields in record
244	27	27	2400		Too few fields in record
244	28	28	2400		Too few fields in record
244	29	29	2400		Too few fields in record
244	30	30	2400		Too few fields in record

February 2003: None

March 2003: None

April 2003: None

May 2003: None

June 2003: None

July 2003: None

August 2003: None

September 2003: None

October 2003: None

November 2003: Data from 11/19/03 1200 to end of year are formatted for use with EQWin software program and was thus removed from the raw records prior to creating the monthly file for processing through the WDMP. The following erroneous error reports resulted from this action.

150 19 305 15 Missing 150 Array data (15 minute data) from 19 (305) 15 to 30 (334) 2400

101 19 323 100 Missing 101 Array data (Hourly Averages) from 19 (323) 100 to 30 (334) 2400

102 19 323 100 Missing 102 Array data (Hourly Average Wind Parameters) from 19 (323) 100 to 30 (334) 2300

241 19 323 2400 Missing 241 data (Daily Averages) from 19 (323) 2400 to 29 (333) 2400

242 19 323 2400 Missing 242 data (Daily Average Wind Parameters) from 19 (323) 2400 to 29 (333) 2400

243 19 323 2400 Missing 243 data (Daily Max/Time Values) from 19 (323) 2400 to 29 (333) 2400

Due to the loading of the new CR10X program (NERR4.csi) data are missing from the data set from 00:30 until 11:45 on 11/19/2003.

14) Other Remarks/notes

On 10/11/2023 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.

During the 2023 updates to precipitation data it was determined that all data for December 2002 should be removed based on metadata remarks that data for that month were missing. All data for 01/01/2003 00:00 were removed as those records are the 15-minute average and total values for 12/31/2002 23:45 through midnight.

No data was lost due to power down in 2003. A dedicated computer at Weeks Bay NERR calls up the weathers station at five-minute intervals retrieving and storing the data. At those times when the modem is unable to connect i.e. line interruptions, power outages at reserve, etc. the weather station information is stored in the SM192 module. Upon reconnecting with the weather station the stored information is then downloaded.

An amended software program for the CR10X was loaded on the 11/19/2003 as previously noted in the metadata.

LiCor:
Prior to the installation of the new NERR_4.CSI program, all 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.

Relative Humidity:
Prior to the installation of the new NERR_4.CSI program, 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.