Delaware (DEL) NERR Meteorological Metadata
January 01, 2005 - December 31, 2005
Latest Update: **October 16, 2023**

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 meteorological data were downloaded from each instrument on the weather station to a Campbell Scientific CR10X datalogger. The CDMO Data Logger Program (NERR4.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 PC208W software supplied by Campbell Scientific.

This software was located on a computer to which the data was uploaded (every 15 minutes) via a short haul modem to a computer located at St. Jones Center for Estuarine Studies. The data was saved as a raw data file (SJ_RAW.dat) onto a separate hard drive and backed up onto Delaware Coastal Programs' (DCP) server.

Once an entire month of data was available, the raw (.dat) file was imported into Excel and run through the EQWin format macro that was designed by the CDMO to reformat the header columns, insert station codes, insert a date column (mm/dd/yyyy), correct the time column format, and reformat the data to the appropriate number of decimal places. After this initial pre-processing takes place the data is copied from Excel and imported into EQWin using the weather.eqi import file. Finally, data were compared against a predetermined set of error criteria (see Part C of this section) using a series of EQWin queries. Monthly and yearly EQWin graphs were also investigated as part of the QA/QC process. EQWin was also used to generate statistics, view graphs, create customized queries & reports of the data, cross query the water, weather, and nutrient data, and finally export the data to the CDMO. Any anomalous data were investigated and were noted below in the Anomalous Data section. Any data corrections that were performed are noted in the Deleted Data section below. Missing data, data that was never collected, is documented in the Missing Data section.

Common occurrences noted in the monthly queries were humidity values exceeding 100% and small negative PAR values. These two occurrences are not addressed directly in the anomalous data section since they are within the range of the two sensors. All errors were double checked with other data that could support such "anomalous" weather changes and noted in the sections that follow. Wind speeds below the 0.5 m/s criteria are common between 1900 and 0600 hours and are not individually checked.

All raw and edited data files were saved to the DCP server with daily tape back-up. Raw data files were also sent via FTP to the CDMO server for additional back-up. Michael G. Mensinger conducted all data collection, data management, and QA/QC activities.

b) Data Collection Schedule

i) Data is collected in the following formats.
(1) 15 minute averages are collected every 15 minutes.
(2) Hourly averages are collected every 60 minutes.
(3) Every 24 hours daily averages, maximums with time, and minimums with time.

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

iii) Hourly average parameters: D
Array 60: Date, Time, Air Temperature (c), Relative Humidity (%), LiCor (par), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction, and Wind Speed Maximum (m/s)

iv) Daily Averages parameters:
Array 144: 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)

v) Daily Maximum parameters:
Array 144: 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:
Array 144: 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 greater than max for the day
- 15 min sample less than the min for the day
- Max and min temp recorded for the day
- 15, 60, or 144 sample not greater than 50 C or less than -40 C

Relative Humidity:
- 15, 60, or 144 sample not greater than 100 or less than 0
- Max and min humidity recorded for the day

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

Wind Speed:
- 15, 60, or 144 sample Wind speed not greater than 30 m/s

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

Barometric Pressure:
- Pressure not greater than 1040 mb or less than 980 mb
- Maximum and minimum values recorded for the day

Time:
- 15-minute interval recorded

For all data:
- Duplicate interval data

3) Research objectives:

The principal objective is to record long-term meteorological data for the St. Jones component of the Delaware National Estuarine Research Reserve in order to observe any environmental changes or trends over time. The data are also used for specific research studies relating to atmospheric deposition of nutrients and pesticides, and nutrient runoff influences from encroaching urbanization on estuarine systems. The meteorological data also serves a supporting role for the SWMP water quality and nutrient data sets since meteorological conditions directly impact these projects.

4) Research methods:

The Campbell Scientific weather station samples every 5 seconds to produce 15 minute, hourly and daily averages of those measurements of air temperature, relative humidity, barometric pressure, rainfall, wind speed and wind direction. The CR10X datalogger can store over three weeks of data before it overwrites the data, in addition there is a storage module that stores in excess of a month's data for backup. The data is sent every 15 minutes to a computer for real-time display and storage. If the short haul modem link failed and data could not be automatically sent from the datalogger to the computer, the data would be downloaded from the CR10X to a laptop computer following procedures in the CDMO Operations Manual. On a monthly basis, 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 sent back to Campbell Scientific for calibration at the following intervals:

- Temperature/Humidity- annual recalibration
- Rain Gauge- annual recalibration
- Wind Speed/Direction- bi-annual recalibration
- Barometric Pressure- bi-annual recalibration
- PAR- bi-annual recalibration

5) Site location and character:

The Delaware National Estuarine Research Reserve is comprised of two component sites, the St. Jones River and Blackbird Creek components. Both components are located along the Delaware Bay Coast. The St. Jones River Component is located in central Kent County Delaware, east of the State capitol city, Dover. The Blackbird Creek component is located in the unincorporated area of Southern New Castle County. The meteorological station site, is located in the St. Jones DNERR component. It is located in a tidal marsh area with a wooded fringe area 100 m to the north, 75 m to east, 75 m to the west and 1+ km to south. The wooded area is of an approximate average height of 16 m.

Position: Latitude 39 degree 05' 20.05" N
Longitude 75 degree 26' 12.78" W

The unit is mounted on a 3-meter tower adjacent to the boardwalk that crosses the marsh. The elevations above the marsh surface are as follows; Barometric pressure - 2.2 m, temperature and relative humidity - 2.9 m , wind and PAR - 4.5 m, highest point on tower (lightning rod) - 4.9 m. The rain gauge is 2.4 m above the surface and 3 m south of the tower. The adjacent boardwalk is 1.1 m above the surface with a railing height of 1.0 m. A vegetative cover of spartina surrounds the area with an average height of 1 m. The tower and rain gauge are both 1 m east of the boardwalk. The weatherstation is located approximately 2 km from the water quality datasonde at Scotton Landing, approximately 4km from the water quality station at Lebanon Landing, and approximately 10km away from the water quality monitoring station at Division Street.

6) Data collection period:

The meteorological monitoring program was started in October 1997 at the DNERR and has been continuous through the present. The data collection format has followed NERRS protocol since standardized meteorological program development in November of 1998.The 2005 data set runs from January 1, 2005 (Julian Date: 1)(00:15 EST) through December 31, 2005.

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 NERR Water Quality Monitoring Project has four stations located at the DNERR. The principal objective of this study is to record long-term water quality data for St. Jones and Blackbird watersheds in order to observe any physical changes or trends in water quality over time. The Blackbird station represents a pristine site while the the three St. Jones River stations represent impacted sites. Measurements are taken every 30 minutes over roughly two-week collecting periods.

The NERR Nutrient Monitoring Project has five stations located at the DNERR. The objective of this monitoring program is to provide baseline information on inorganic nutrient and Chla water quality status in the Delaware NERR while also contributing to baseline information nationally. Diel and grab samples are collected monthly at each of the five sites.

In addition atmospheric deposition of rainfall events is performed in the DNERR watersheds to monitor and characterize the nutrient input to the estuary from differing storm events and seasonally. One sampler is currently positioned in the St. Jones watershed (the additional two were decomissioned in 2003) and one is located in the Blackbird watershed.

II. Physical Structure Descriptors

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

LiCor Quantum Sensor
Model # LI190SB
Stability: <±2% change over 1 yr
Operating Temperature: -40 to 65°C
Sensitivity: typically 5 µA per 1000µmoles s-1 m-2
Light spectrum wavelength: 400 to 700 nm
Date of last calibration: 8/15/2000 (installed new 12/20/2000)
12/19/02: Replaced with unit # (s/n Q22182, recalib 11/14/2002)
12/21/04: Replaced with unit # (s/n Q99240, recalib 09/17/2004)

Wind Monitor
Model # 05103
Range: 0-60 m/s; 360° mechanical

Date of last calibration: 04/05/1999 (installed new 12/20/2000)
12/19/2002: Replaced with unit (s/n WM49558)
12/21/2004: Replaced with unit (s/n 35269, recalib 09/01/2004)

Temperature and Relative Humidity
Model #: HMP45C
Operating Temperature: -40-+60°C
Temperature Measurement Range: -40-+60°C
Temperature Accuracy: ± 0.2 °C @ 20°C
Relative Humidity Measurement Range: 0-100% non-condensing
RH Accuracy: +/-2% RH (0-90%) and +/-3%(90-100%)
Uncertainty of calibration: ± 1.2% RH
Date of Last calibration: Unit 2 unknown (installed new 12/20/2000)
Unit 1 11/27/2001 (installed new 12/19/2001)
12/19/2002: Replaced with unit #1 (s/n U1430039, recalib 10/09/2002)
12/22/2003: Replaced with unit #2 (s/n V2530002, recalib 11/03/2003)
12/21/2004: Replaced with unit #1 (s/n U1430039, recalib 09/14/2004)
12/16/2005: Replaced with unit #2 (s/n V2530002, recalib 04/12/2005)

Barometric Sensor
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: 9/12/00 (installed new 12/20/2000)
12/19/2002: Replaced with unit # (s/n R1630014, recalib 10/09/2002)
12/21/2004: Replaced with unit # (s/n V3320037, recalib 09/17/2004)

Tipping Bucket Rain Gauge
Model #: TE 525
Range: 0.1 mm
Accuracy: 1.0% at <2"/hr
Date of Last calibration: field calibrated 12/20/2000, 12/19/2001, 12/19/2002, 12/22/2003, 12/22/2004, 12/16/2005

Storage Module
Model#: SM4M
Storage capacity: 4MB
Operating range: -35C to +65C
Processor: Hitachi H8S
Baud rates for data storage: 9600, 76800 baud
Baud rates for telecommunication: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200
Memory type: user selectable for either ring style or fill and stop
Power requirements: 5 +/-0.3V DC @100mA (max.)

Campbell Scientific CR10X wiring panel has 128K of flash memory (EEPROM), in which it stores the operating system and its 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:

- DELSJMET (station code) "DEL" indicates the Delaware NERR
"SJ" indicates the St. Jones River Site
"MET" indicates meteorological sampling/data

- SMPLDATE = Calendar date
- STNCODE = Station code
- RH = relative humidity
- TotPAR = photosynthetically active radiation
- TotPrcp = precipitation
- BP = barometric pressure

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.

Wind speeds below the 0.5 m/s criteria are common between 1900 and
0900 hours and occurred with some frequency.

Negative PAR data have been observed during the night; small negative values are within range of the sensor and are due to normal errors in the sensor and the CR10X Datalogger. The Maximum signal noise error for the Licor sensor is +/- 2.214 mmoles/m2 over a 15 minute interval. These data have been retained.

Relative Humidity data greater than 100% have been observed; these data are within range of the sensor accuracy of +/-3%. These data have been retained.

January 2005

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amounts below follow this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	01/14/2005	14	07:15	15	06.9
delsjmet	01/14/2005	14	07:30	15	05.1

February 2005 (none)

March 2005 (none)

April 2005 (none)

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amount below follows this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	04/08/2005	98	01:15	15	06.4

May 2005 (none)

June 2005 (none)

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amounts below follows this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	06/22/2005	173	19:00	15	13.0
delsjmet	06/22/2005	173	19:15	15	05.8

July 2005 (none)

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amounts below follow this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	07/08/2005	189	05:00	15	05.8
delsjmet	07/17/2005	198	12:45	15	11.4
delsjmet	07/27/2005	208	19:30	15	07.9
delsjmet	07/27/2005	208	19:45	15	07.9

August 2005

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amounts below follow this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	08/05/2005	217	21:15	15	10.4
delsjmet	08/08/2005	220	16:30	15	15.2
delsjmet	08/08/2005	220	16:45	15	08.1
delsjmet	08/08/2005	220	17:00	15	06.1
delsjmet	08/08/2005	220	17:15	15	08.9
delsjmet	08/16/2005	228	19:45	15	10.9
delsjmet	08/16/2005	228	20:00	15	16.8
delsjmet	08/16/2005	228	20:15	15	09.4
delsjmet	08/16/2005	228	23:30	15	08.6

September 2005 (none)

October 2005

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amounts below follow this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	10/08/2005	281	17:00	15	05.1
delsjmet	10/11/2005	284	03:15	15	06.4
delsjmet	10/22/2005	295	05:30	15	05.6

November 2005

a) Brief, intense periods of rain are commonly associated with convective storms. The precipitation amount below follows this trend; data retained.

STNCODE	SMPLDATE	JULIAN DATE	TIME	CLASS	TotPrcp
delsjmet	11/29/2005	333	24:00	15	05.1

December 2005 (none)

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.

a) All parameters from the hourly (60) readings on January 10, 2005 (1500 EST) were deleted. The weather station previously stopped recording data resulting in an incomplete set of values for this hourly calculation.

b) All parameters from the daily (144) readings on January 10, 2005 (2400 EST) were deleted. The weather station previously stopped recording data resulting in an incomplete set of values for this daily calculation.

c) All parameters from the hourly (60) readings on January 25, 2005 (1100 EST) were deleted. The weather station previously stopped recording data resulting in an incomplete set of values for this hourly calculation.

d) All parameters from the daily (144) readings on January 25, 2005 (2400 EST) were deleted. The weather station previously stopped recording data resulting in an incomplete set of values for this daily calculation.

e) All parameters from the hourly (60) readings on February 8, 2005 (1000 EST) were deleted. Missing data for the generation of these readings occurred as a result of a program upload.

f) All parameters from the daily (144) readings on February 8, 2005 (2400 EST) were deleted. Missing data for the generation of these readings occurred as a result of a program upload.

g) The 24-hour PAR value (66673.0 mmol/m^2) on April 04, 2005 was deleted from the dataset. This number was removed since the 24-hour reading was
miscalculated in an unknown manner. The correct calculation should have been 49218.8 mm/m^2.

h) All parameters from the hourly (60) readings on November 16, 2005 (1100 EST) were deleted due to missed 15 minute readings associated with telemetry equipment installation.

i) All parameters from the daily (144) readings on November 16, 2005 (2400 EST) were deleted due to missed 15 minute and hourly readings associated with telemetry equipment installation.

j) All parameters from the fifteen minute (15) readings on December 01, 2005 (1500 EST) were deleted due to a program reload associated with telemetry equipment.

k) All parameters from the hourly (60) readings on December 01, 2005 (1500 EST) were deleted due to missed 15 minute readings associated program reload associated with telemetry equipment.

l) All parameters from the daily (144) readings on December 01, 2005 (2400 EST) were deleted due to missed 15 minute and hourly readings associated with telemetry equipment installation.

m) Fifteen minute (15) temperature and humidity readings on December 16, 2005 (0915 EST) were deleted due to sensor replacement.

n) Hourly (60) temperature and humidity readings on December 16, 2005 (1000 EST) were deleted due to sensor replacement.

o) Daily (144) temperature and humidity readings on December 16, 2005 (2400 EST) were deleted due to sensor replacement.

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.

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement
of a sampling station platform. For more details on deleted, see the Deleted Data Section (12). If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

January 2005

a) Data are missing from January 09, 2005 (0815 EST) through January 10, 2005 (1430 EST). The CR10X stopped recording data for an unknown reason.

b) Data are missing from January 21, 2005 (0600 EST) through January 25, 2005 (1015 EST). The CR10X stopped recording data for an unknown reason.

February 2005

a) Data are missing from February 05, 2005 (1745 EST) through February 07, 2005 (1530 EST). The CR10X stopped recording data for an unknown reason.

b) Data are missing from February 07, 2005 (1645 EST) through February 8,2005 (0900 EST) The CR10X stopped recording data for an unknown reason.

c) Data are missing on February 08, 2005 (0930 EST) as a result of a program reupload.

November 2005

a) Data are missing from November 16, 2005 (0815-1030 EST) due to work associated with telemetry equipment installation.

14) Other Remarks/notes

On 10/16/2023 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.

a) LiCor:
Prior to the installation of the new NERR_4.CSI program on 11/14/2003, 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 arechanged in the raw data, we cannot confirm that they are all valid points.

b) Relative Humidity:
Prior to the installation of the new NERR_4.CSI program on 11/14/2003, all values over 100% were altered in the raw data to read 100%. These values may indicate an supersaturated air, calibration problems, or a sensor malfunction. Because these values are changed in the raw data, we cannot confirm that they are all valid points.

c) The St. Jones MET station began operating as a telemetry site on November 16, 2005 using Campbell Scientific equipment to transmit data to the GOES satellite as part of a pilot project.