

Chesapeake Bay Virginia (CBV) NERR Meteorological Metadata

January 2008 - December 2008

Latest Update: September 23, 2011

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons.

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Responsible for Field Data Collection

2) Entry verification –

a) Data Input Procedures:

Some History: In 2005, the Centralized Data Management Office converted all SWMP (System Wide Monitoring Program) weather data collected with CR10X program versions prior to version 4.0. 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 (which was used in 2006 metadata reporting) produces averages, maximums and minimums every fifteen minutes (array 15), every hour (array 60) and every day (array 144) for any sensors connected to the CR10X.

At the Taskinas Creek Met Station prior to November 30th, 2006, 15-minute, 1-hour average, and 24-hour data were downloaded from each sensor on the weather station to a Campbell Scientific CR10X datalogger. The CDMO Data Logger Program (NERR.SCI) was loaded into the CR10X and controlled the sensors and data collection schedule. Data collected from the CR10X were stored on a Campbell Scientific storage module (SM4M) and downloaded manually onto a laptop computer using PC208W program from Campbell Scientific. Data were downloaded biweekly or monthly from the storage module located within the weather station.

The raw data files were then exported from the PC208W program in comma-delimited format (.DAT files) and opened in Microsoft Excel using the EQWIN Format Macro developed by CDMO to reformat the header columns, insert station codes, insert a date column, correct the time column format, and format all columns to the correct number of decimal places. This formatted file was then copied into the EQWIN weather.eqi file where the data were QA/QC checked and archived in a database. Data were investigated as recommended in the CDMO NERR SWMP Data Management Manual Version 5.2, and included the use of queries, graphs, and reports. EQWIN was also used to generate customized reports and export the data in a standardized format to send to

CDMO. Any anomalous data were investigated and noted in an Anomalous Data section (Section 11). Data tagged as being “anomalous” are double checked and where the data truly appear anomalous, they are compared with other regional meteorological data for verification. Any data corrections or removed data were noted in the Deleted Data section (Section 12). Any missing data was documented in the Missing Data section (Section 13).

After switching out the Campbell Scientific CR10X Datalogger for a CR1000 instrument at the Taskinas Creek Station (on December 1, 2006) programming changes dictated only 15-minute data being downloaded from each sensor. The CDMO Data Logger Program (CBV_CBVTCMET_V3.0_113006.CR1) was loaded into the CR1000 which controls the sensors and data collection schedule. Data are downloaded biweekly to monthly directly from the CR1000 as the storage module was no longer needed in this new configuration.

For data collection from December 1, 2006 to present, the CR1000 datalogger was programmed to collect data in the following formats:

- Averages from 5-second data:
 - Air Temperature (°C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction (degrees), Wind Direction Standard Deviation (degrees) (Began recording Wind Direction Standard Deviation as a standard parameter on October 1st, 2008), Battery Voltage (volts)
- Maximum, Minimum, and their times from 5-second data:
 - Air Temperature (°C) (these data are not available in the dataset, but are available from the CBV NERR)
- Maximum and times from 5-second data:
 - Maximum Wind Speed, (m/s) (began recording Maximum Wind Speed as a standard parameter on May 23rd, 2008)
- Totals:
 - Precipitation (mm), PAR (millimoles/m²), and Cumulative Precipitation (mm) (CBNERRVA started collecting Cumulative Precipitation data on May 23rd, 2008 with new program)

Following the installation of the CR1000 (and associated programs), hourly and daily data were no longer collected. In addition, hardware and software changes resulted in a reduced parameter list which no longer included collecting the following parameters (now considered Non-SWMP or Optional parameters):

- Maximum Relative Humidity
- Maximum Relative Humidity Time
- Minimum Relative Humidity
- Minimum Relative Humidity Time
- Maximum Barometric Pressure
- Maximum Barometric Pressure Time
- Minimum Barometric Pressure
- Minimum Barometric Pressure Time
- Minimum Wind Speed
- Minimum Wind Speed Time

Data collected from the CR1000 Version 3.0 Meteorological Program were processed in a slightly different manner than the CR10X. Data were collected directly from the CR1000 and downloaded onto a laptop computer using the LoggerNET Ver. 3.2 program from Campbell Scientific. These raw data files are then exported from the LoggerNET program in comma-delimited format (.DAT

files) and run through a PERL Script program (CONVERT1_GUI_BATCH_V4.exe) to convert the CR1000 raw data file to the CR10X format (with a .csv extension). This intermediate file can then be opened with the EQWIN Format Macro developed by CDMO (November 2006) to reformat the header columns, insert station codes, insert a date column, correct the time column format, and format all columns to the correct number of decimal places (although with a reduced parameter list – see above). The formatted file could then be processed in EQWIN using the same methods described in the paragraph above for the CR10X data.

Effective with the submission of 2007 SWMP MET data, the data submission process was enhanced in order to improve the data delivery and availability of the non-telemetered NERRS SWMP data to the public. CDMO developed a new data upload tool for the submission raw 2007 MET files to the CDMO (including SWMP and Non-SWMP parameters) as well as a new QA/QC Process.

Data are still collected from the CR1000 data logger via Loggernet (Version 3.2) using a laptop computer (Dell Toughbook). Files are exported from LoggerNet in a comma-delimited format (.Dat files) and uploaded to the CDMO where they are stored in a Microsoft SQL provisional database and undergo automated primary QAQC and become part of the CDMO's online provisional database. During primary QAQC, data were flagged if they are missing or out of sensor range. The edited file is then returned to CBNERRVA where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro (Now Version 2.01242009). The macro inserts station codes, creates metadata worksheets for flagged data, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, append files, and export the resulting data file to the CDMO for tertiary QAQC and assimilation into the CDMO's authoritative online database (ODIS). For more information on QAQC flags and QAQC codes, see Sections 11 and 12.

Note: The Meteorological Program stored in the CR1000 was updated from Version 3.0 to Version 4.2 on 9/19/2007 to fix NAN values in the wind speed data and allow for negative PAR values. The Meteorological Program was again updated (from Version 4.2 to Version 5.5) on 5/23/2008 to adjust for how PAR data was transmitted through the GOES system as well as allow for the collection of cumulative precipitation data and again on 6/5/2008 to account for a new 7-Wire Temperature/Humidity Sensor.

Brief Summary of Standard, Non-Standard, and Flagged Data Criteria for 2008 Meteorological Data.

- Averages from 5-second data:
 - Air Temperature (Standard and Flagged)
 - Relative Humidity (Standard and Flagged)
 - Barometric Pressure (Standard and Flagged)
 - Wind Speed (Standard and Flagged)
 - Wind Direction (Standard and Flagged)
 - Battery Voltage (Non-Standard and Not Flagged)
- Maximum, Minimum, and their times from 5-second data:
 - Maximum and Minimum Air Temperature (Non-Standard and Not Flagged)
 - Max Wind Speed (Non-Standard and Not Flagged until 5/23/2008 and then became a standard and Flagged Parameter)
 - Wind Direction Standard Deviation (degrees) from 5-second data (Non Standard and Not Flagged until 10/1/2008 then Standard and Flagged)
- Totals:
 - Precipitation (mm) (Standard and Flagged)
 - PAR (millimoles/m²) (Standard and Flagged)
 - Cumulative Precipitation (mm) (Non-Standard and Not Flagged until 5/23/2008 and then became a Standard and Flagged Parameter.)

Scott Lerberg was responsible for the QA/QC of the 2008 Weather data.

3) Research objectives:

The principal objective is to record long-term meteorological data within the York River watershed in order to observe any environmental changes or trends over time. Data may also be used for watershed research. Samples were taken every 5 seconds and averaged or totaled over 15 minutes for roughly two-week collecting intervals.

4) Research methods:

The Campbell Scientific weather station samples every 5 seconds to produce 15 minute averages (or totals in the case of rainfall and PAR readings) of measurements of air temperature, relative humidity, barometric pressure, rainfall, PAR, wind speed and wind direction (for more information see section 2). A bi-weekly to monthly sampling interval was chosen to periodically inspect and perform field verifications of the accuracy of the sensors and collect and send the raw data to CDMO for primary QA/QC. Sensors are scheduled to be removed and sent back to Campbell Scientific for calibration at minimum of every two years. It should be noted that all sensors were replaced or re-calibrated between June 2 to June 5th, 2008 (excluding the wind monitor which was replaced on January 5th, 2009 (for more information see Section 9 of this document.)

Campbell Scientific data telemetry equipment was installed at the Taskinas Creek station on 11/30/2006 and transmits data to the NOAA GOES satellite, NESDIS ID # 3B009218. The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The “real-time” telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO’s authoritative online database. Provisional and authoritative data are available at <http://cdmo.baruch.sc.edu>.

5) Site location and character :

The Chesapeake Bay National Estuarine Research Reserve in Virginia (CBNERRVA) is located on the York River, a tributary of the Chesapeake Bay. CBNERRVA maintains a long-term water quality-monitoring station and stream gauge station at Taskinas Creek, a tributary of the York River that is located in the transitional zone of the York River State Park. The Taskinas Creek weather station is also located within York River State Park. The park is located on the mainstem of the York River, which is 50 km long, 38 kilometers from the mouth of the river, and 2.25 kilometer wide near the weather station. The weather station is located (37°24' 50.79850" N, 76°42' 44.51934" W) on a bluff (11m elevation) 60m (horizontal distance) from the York River in a manicured lawn area of the park. No trees or other major structures are within a 35m radius of weather station. The stream gauge is located 2km NW (288 degrees) of the weather station and the water quality station is located 200m (298 degrees) of the weather station. The weather station has a landscape fence around it to deter park visitors from tampering with it. All the instruments are located on the approximately 3.5 m aluminum tower following the descriptions outlined in the CDMO Manual V 4.0. The Tipping Bucket Rain gauge is located within 2m of the tower. The sensors were wired to the CR1000 following the protocol in the CDMO Manual. The station is located approximately 40 feet above mean sea level. Specific sensor heights are as follows:

Ground to Precipitation Gauge (center of tipping unit) = 172.8 cm

Ground to Screen on Funnel over Precipitation Gauge = 193.7 cm

From Humidity Sensor (Closest Sensor on Tower) to Precipitation Gauge = 157.5 cm
Ground to Bottom of Solar Panel = 170.8 cm
Ground to Top of Solar Panel = 201.9 cm
Ground to Temperature and Humidity Probe = 183.5 cm
Ground to Barometric Pressure Sensor (in box) = 171.5 cm
Ground to Par Sensor (TOP) = 336.6 cm
Ground to Wind Sensor (along main line) = 360.7 cm

6) Data collection period:

Weather data has been collected from this meteorological station at Taskinas Creek since 2000. Within the calendar year 2008 data was collected (by field downloads onto the laptop computer) on the following dates:

- January 3, 2008 (from 01/01/2008 at 0:15 to 01/03/2008 at 10:15)
- January 23, 2008 (from 01/03/2008 at 10:30 to 01/23/2008 at 9:45)
- January 29, 2008 (from 01/23/2008 at 10:00 to 01/29/2008 at 09:45)
- February 14, 2008 (from 01/29/2008 at 10:00 to 02/14/2008 at 10:45)
- February 27, 2008 (from 2/14/2008 at 11:00 to 2/27/2008 at 09:00)
- March 17, 2008 (from 02/27/2008 at 9:15 to 03/17/2008 at 10:30)
- April 2, 2008 (from 03/17/2008 at 10:45 to 04/02/2008 at 14:30)
- April 14, 2008 (from 4/02/2008 at 14:45 to 04/14/2008 at 09:00)
- April 28, 2008 (from 4/14/2008 at 09:15 to 04/28/2008 at 08:15)
- May 13, 2008 (from 04/28/2008 at 08:30 to 05/13/2008 at 08:15)
- May 23 2008 (from 05/13/2008 at 08:30 to 05/23/2008 at 14:15)
 - Missing Data on 6/2/2008 from 14:30 to 15:30 due to Station Maintenance
- June 2, 2008 (from 05/23/2008 at 15:45 to 06/02/2008 at 10:30)
 - Missing Data on 6/2/2008 from 10:45 to 11:45 due to Station Maintenance
- June 5, 2008 (from 06/02/2008 at 12:00 to 06/05/2008 at 14:00)
- June 11, 2008 (from 06/5/2008 at 14:15 to 06/11/2008 at 08:30)
- June 23, 2008 (from 06/11/2008 at 08:45 to 06/23/2008 at 08:30)
- July 7, 2008 (from 06/23/2008 at 08:45 to 07/07/2008 at 09:15)
- July 22, 2008 (from 07/07/2008 at 09:30 to 07/22/2008 at 08:30)
- August 4, 2008 (from 07/22/2008 at 08:45 to 08/04/2008 at 09:45)
- August 18, 2008 (from 08/04/2008 at 10:00 to 08/18/2008 at 09:00)
- September 2, 2008 (from 08/18/2008 at 09:15 to 09/02/2008 at 09:00)
- September 15, 2008 (from 09/02/2008 at 09:15 to 09/15/2008 at 08:30)
- September 29, 2008 (from 09/15/2008 at 08:45 to 09/29/2008 at 8:15)
- October 13, 2008 (from 09/29/2008 at 08:30 to 10/13/2008 at 08:15)
- October 27, 2008 (from 10/13/2008 at 08:30 to 10/27/2008 at 08:45)
- November 10, 2008 (from 10/27/2008 at 09:00 to 11/10/2008 at 09:15)
- December 08-2008 (from 11/10/2008 at 09:30 to 12/08/2008 at 11:30)
- December 22, 2008 (from 12/08/2008 at 11:45 to 12/22/2008 at 09:30)
- December 31, 2008 (from 12/22/2008 at 09:45 to 12/31/2008 at 23:45)

7) Distribution – This section will address data ownership and data liability with the following excerpt from the Ocean and Coastal Resource Management Data Dissemination Policy for the NERRS System-wide Monitoring Program in the metadata.

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 this 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 and 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 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 comma separated format.

8) Associated researchers and projects:

CBNERRVA System Wide Monitoring Program. Since its initiation in 1995, CBNERRVA has fully participated in the NOAA/NERRS System-Wide Monitoring Program. Within the York River system, CBNERRVA maintains a network of long-term, year-round continuous water quality stations located at White House (2003-current), Sweet Hall Marsh (2000-current), Taskinas Creek (1995-current), Clay Bank (2001-current), Gloucester Point (2003-current) and Goodwin Island (1997-current). In 2002 and 2004, CBNERRVA implemented the NOAA/NERRS nutrient/plant pigment monitoring program and SAV Tier II Biological Monitoring Program, respectively. Beginning in 2000, CBNERRVA established a weather station at Taskinas Creek to support meteorological monitoring aspects of SWMP. In addition, CBNERRVA maintains additional weather stations at Sweet Hall Marsh, Goodwin Islands, and Harcum Creek to support York River watershed level studies and site-specific research projects.

National Atmospheric Deposition Program's National Trends Network (NADP/NTN) and Mercury Deposition Network (NADP/MDN). CBNERRVA staff maintains the southern Chesapeake Bay NADP/NTN and NADP/MDN station (ID: VA98) at Harcum, Va. The network's purpose is to collect data on the chemistry of precipitation for monitoring of temporal and geographical long-term trends of concentrations and loading rates. Measured physical parameters include air temperature, precipitation, PAR, wind speed and direction. Measured chemical parameters include hydrogen ion activity (acidity as pH), sulfate, nitrate, ammonium, chloride, base cations (such as calcium, magnesium, potassium and sodium), total mercury and methyl-mercury. The NADP/NTN and NADP/MDN stations were established in August, 2004 and December, 2004, respectively. Real-time delivery of physical parameters is currently available at this station through the National Weather Service's Hydrometeorological Automated Data System (HADS; NESDIS ID: 3B01236C; NWS Location ID: HAXV2). Real-time data are available via the web at <http://www.nws.noaa.gov/oh/hads/>. Archived precipitation chemistry

data are available via the web at <http://nadp.sws.uiuc.edu> . Partners: CBNERRVA, NADP and VaDEQ.

Integrated Ocean Observing System (IOOS). The CBNERRVA Meteorological Monitoring Program supports the national and Mid-Atlantic Coastal Ocean Observing Regional Association (MACOORA) through its participation in NERRS SWMP. CBNERRVA is also actively engaged at a more subregional and local level through its support of the Chesapeake Bay Observing System (CBOS) and the Virginia Estuarine and Coastal Observing System (VECOS). Real-time delivery of physical parameters is currently available for three stations through the National Weather Service's Hydrometeorological Automated Data System; stations include Taskinas Creek (NESDIS ID: 3B009218; NWS Location ID: YRSV2), Sweet Hall Marsh (NESDIS ID: 3B0116F6; NWS Location ID: SHXV2) and Harcum (NESDIS ID: 3B01236C; NWS Location ID: HAXV2). Real-time delivery of data for a fourth station located at Goodwin Islands can be obtained through NOAA's National Data Buoy Center (Station ID: GDIV2) at <http://www.ndbc.noaa.gov/> and through the VECOS web site (Station ID: YRK000.00P) at <http://chsd.vims.edu/realtime/>.

II. Physical Structure Descriptors

9) Sensor specifications – Include parameter description, units, sensor type, model #, (operating temperature), range of measurement, accuracy, (temperature dependence), (sensitivity), (stability), date of last calibration for each sensor and CR1000 description.

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 previous calibration: 9/25/2006. Date Installed 11/30/2006.

Date of last calibration: 9/6/2007. Date Installed 6/5/2008

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 previous calibration: 9/25/2006. Date Installed 11/30/2006.

Date of last calibration: 9/6/2007. Date Installed 6/5/2008

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 previous calibration: 7/10/2006. Date Installed 11/30/2006

Date of last calibration: 9/6/2007. Date Installed 6/5/2008

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 (134 mph); gust survival 100 m/s (220 mph)

Accuracy: +/- 0.3 m/s

Date of previous calibration 9/7/2006. Date Installed 11/30/2006

Date of last calibration 8/1/2008. Date Installed 1/5/2009

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: +/- 3 degrees

Date of previous calibration 9/7/2006. Date Installed 11/30/2006

Date of last calibration 8/1/2008. Date Installed 1/5/2009

Parameter: LI-COR Quantum Sensor

Units: mmols m⁻² (total flux)

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

Model #: LI190SB

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

Stability: <±2% change over 1 yr

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

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

Multipliers: ***From January 1 to June 5th, 2008 (par multiplier was 1.3025952) and from June 5th 2008 to December 31, 2008 (par multiplier was 1.467756).***

Date of previous calibration: 6/13/2006. Date Installed 11/30/2006

Date of last calibration: 9/7/2007. Date Installed 6/5/2008

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: Calibrated on 6/2/2008 (before that was 8/3/2007)

The CR1000 has 2 MB of Flash EEPROM that is used to store the Operating System. Another 128 K Flash is used to store configuration settings. A minimum of 2 MB SRAM is (4 MB optional upgrade) available for program storage (16K), operating system use, and data storage. Additional storage is available by using a compact flash card in the optional CFM100 Compact Flash Module.

Date CR1000 Installed: December 1, 2006

10) Coded variable definitions - List the sampling station, sampling site code, and station code used in the data.

- Sampling station: Taskinas Creek
- Sampling site code: TC
- Station code: cbvtcmet

11) QAQC flag definitions – This section details the automated primary and secondary QAQC flag definitions. Include the following excerpt.

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is above or below sensor range, or missing. All remaining data are then flagged 0, as passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

- 5 Outside High Sensor Range
- 4 Outside Low Sensor Range
- 3 Data Rejected due to QAQC
- 2 Missing Data
- 1 Optional SWMP supported parameter
- 0 Passed Initial QAQC Checks
- 1 Suspect Data
- 2 *Open - reserved for later flag*
- 3 *Open - reserved for later flag*
- 4 Historical Data: Pre-Auto QAQC
- 5 Corrected Data

12) QAQC code definitions – This section details the secondary QAQC Code definitions used in combination with the QAQC flags above. Include the following excerpt.

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the CR1000, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point.

General Errors

GIM	Instrument Malfunction
GIT	Instrument Recording Error, Recovered Telemetry Data
GMC	No Instrument Deployed due to Maintenance/Calibration
GMT	Instrument Maintenance
GPD	Power Down
GPF	Power Failure / Low Battery
GPR	Program Reload
GQR	Data Rejected Due to QA/QC Checks
GSM	See Metadata

Sensor Errors

SIC	Incorrect Calibration Constant, Multiplier or Offset
SNV	Negative Value

SOC	Out of Calibration
SSN	Not a Number / Unknown Value
SSM	Sensor Malfunction
SSR	Sensor Removed
Comments	
CAF	Acceptable Calibration/Accuracy Error of Sensor
CDF	Data Appear to Fit Conditions
CRE	Significant Rain Event
CSM	See Metadata
CVT	Possible Vandalism/Tampering

13) Other remarks/notes:

Some General Notes

- Data are missing due to equipment or associated specific sensors not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NANs in the dataset stand for “not a number” and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.
- Small negative PAR values are within range of the sensor and are due to normal errors in the sensor and the CR1000 Datalogger. The Maximum signal noise error for the Licor sensor is +/- 2.214 mmol/m² over a 15 minute interval.
- Relative Humidity data greater than 100 are within range of the sensor accuracy of +/-3%.
- Cumulative precipitation data are recorded from 00:00 to 23:59 with the daily total recorded at the midnight mark (00:00). The midnight CumPrp value is actually the total from the previous day.
- All Reserves were required to align their wind direction sensors to True North by April, 1 2008. CBV NERR's wind sensor aligned to True North from the very first dataset being publically displayed by CDMO.

Explanations for Data Coded as *CSM* (see metadata) within Taskinas Creek 2008 Dataset

1. Precipitation Corrections (Flagged as 5 or Corrected Data).

- These were false rain gauge readings resulting from tipping the rain gauge (to check accuracy) during bi-weekly downloads as well as several readings on June 2nd, 2008 during a time where the Rain Gauge was calibrated using the Static Method. In addition, after May 23rd (i.e. when Cumulative Precipitation Data was also recorded and collected on the CR1000), the Cumulative Precipitation Data for days the rain gauge was checked were also corrected and flagged as 5).

<u>Date</u>	<u>Time</u>	<u>Original Precipitation Value</u>
1/3/2008	10:30	1.016
1/23/2008	9:45	0.508
1/29/2008	10:00	0.508
2/14/2008	11:00	0.508
2/27/2008	9:15	0.508
3/17/2008	10:45	1.270
4/4/2008	14:45	1.016

4/14/2008	9:15	0.508
4/28/2008	08:30	1.016
5/13/2008	08:30	0.762
6/2/2008	09:30	0.508 (cumulative precipitation corrected)
6/2/2008	13:15	2.032 (rain gauge calibration)
6/2/2008	13:30	4.826 (rain gauge calibration)
6/2/2008	13:45	4.572 (rain gauge calibration)
6/2/2008	14:00	8.128 (rain gauge calibration)
6/11/2008	08:45	0.508
6/23/2008	08:45	0.508
7/07/2008	09:30	1.016
7/21/2008	08:45	0.508
8/04/2008	09:45	0.508
8/04/2008	10:00	0.508
8/18/2008	09:00	0.254
8/18/2008	09:15	0.508
9/02/2008	09:15	0.508
9/15/2008	08:45	0.508
9/29/2008	08:30	0.508
10/13/2008	08:15	0.762
10/27/2008	09:00	0.508
11/10/2008	09:15	0.508
12/08/2008	11:30	0.762
12/22/2008	09:45	0.762

2. Missing Data Due to New Program Upload on 5/23/2008 and 6/2/2008 (Data Flagged as -2 for Missing Data).

- During the time periods of 14:30 to 15:30 on May 23rd and 10:45 to 12:00 on June 2nd, there was no meteorological data collected at the Taskinas Creek station due to powering down the station for maintenance followed by program uploads.

3. New Program Upload (Version 5.5) and Sensor Switchouts on 5/23/2008 and 6/2/2008 and 6/5/2008 (Data Flagged as -3 for Rejected Data).

- During program uploads, the 5 second data stored in the CR1000 is lost, which comprising the 15-minute data recorded during downloads. In a similar fashion, during times of sensor maintenance or sensor replacement, the 5-second readings are also inaccurate which compromises the corresponding 15 minute readings. The following list are three time periods (on May 23rd, June 2nd, and June 5th) when maintenance was done on the Taskinas Creek MET station resulting in data which must be rejected as inaccurate (and has been coded appropriately!).
- On May 23rd, a new version of the program was installed at the Taskinas Creek Station between the time period of 15:30 and 15:45. For this reason, all the data on 5/23/2008 at 15:45 have been flagged as “-3” and coded as “GPR” indicating that data has been rejected due to a program upload to the CR1000 (with the exception of total precipitation and cumulative precipitation as there were no rain events on that day and Wind Direction Standard Deviation as this was still an “optional parameter” at this time).
- On June 2nd, a new version of the program was installed at the Taskinas Creek Station between the time period of 11:45 and 12:00. For this reason, all the data on 6/2/2008 at 12:00 have been flagged as “-3” and coded as “GPR” indicating that data has been rejected

due to a program upload to the CR1000. In addition, a newly calibrated LICOR sensor was installed (then removed) during the time period of 11:45 and 12:45 so during that time the PAR data are inaccurate and have been flagged as “-3” and coded as “GMT” indicating the data have been rejected due to sensor maintenance. Finally, the barometric sensor was replaced during the time period of 12:45 and 13:15, so pressure readings at 13:00 and 13:15 are inaccurate and have been flagged as “-3” and coded as “GMT” indicating the data have been rejected due to sensor maintenance.

- On June 5th, a new version of the program was installed at the Taskinas Creek Station between the time period of 14:00 to 14:15.. For this reason, all the data on 6/5/2008 at 14:15 have been flagged as “-3” and coded as “GPR” indicating that data has been rejected due to a program upload to the CR1000 (with the exception of total precipitation and cumulative precipitation as there were no rain events during the time the program was reloaded and Wind Direction Standard Deviation as this was still an “optional parameter” at this time). In addition, the temperature/humidity sensor was replaced during the time period of 14:15 to 15:00 so during that time the temperature and relative humidity data are inaccurate and have been flagged as “-3” and coded as “GMT” indicating the data have been rejected due to sensor maintenance. Finally, the LICOR sensor was replaced during the time period of 14:15 and 15:00 so during that time period the PAR data are inaccurate and have been flagged as “-3” and coded as “GMT” indicating the data have been rejected due to sensor maintenance. Failure to properly add in the correct PAR multiplier during this time period also led rejected PAR data on 6/5/2008 and 6/6/23008 (please see bullet 4 below).

4. Incorrect Par Multiplier from 15:15 on 6/5/2008 to 10:45 on 6/6/2008. (Data Flagged as 3 for Rejected Data and Coded as “SIC” for “Incorrect Multiplier)

- On June 5th, 2008, the LICOR sensor was replaced at the Taskinas Creek Station. Unfortunately, field crew accidentally entered the wrong PAR multiplier into the CR1000, a mistake that was not discovered and resolved until the following morning. Due to this, the data from 15:15 on June 5th 2008 until 10:45 on June 6th 2008 have been rejected and coded appropriately.

5. PAR Values between 1/1/2008 and 7/23/2008 (Data Flagged as 1 for Suspect Data)

- This issue was addressed in the general notes portion at the beginning of this section. On 9/19/2007 the new MET Program (version 4.2) was uploaded to the CR1000 at Taskinas Creek. This program (unlike the previous version 3.0 program) did allow for negative PAR values (which before were “corrected” to a zero value). These small negative PAR values are within range of the sensor and are due to normal errors in the sensor and the CR1000 Datalogger. The Maximum signal noise error for the Licor sensor is +/- 2.214 mmoles/m2 over a 15 minute interval. These data values were thus flagged as “1” indicating suspect data and coded “SNV” for negative value and CAF for being as acceptable within the error of the sensor.

6. Total Precipitation and Cumulative Precipitation Values Between 4/28/09 08:45 - 5/13/08 08:15 and 8/5/09 00:15 – 8/18/09 08:45 (Data Flagged as 1 for Suspect Data)

- During these two time periods, leaf litter and other airborne obstructions clogged the rain gauge opening sometime in the time period between biweekly “checks”. Comparisons with other nearby meteorological stations (Sweet Hall Marsh and Harcum) indicate that data collected at this station appear to be reasonable (in terms of documenting rain events); however, at the bi-weekly check of Taskinas at the end of these two time periods, there was standing water in the funnel, indicating that data might be compromised during

these time periods. For this reason, the data have been flagged as “suspect” but not “rejected” (due to the comparisons with the other nearby stations).

7. Optional Data (Max Wind Speed and Cumulative Precipitation (from 1/1/2008 to 5/23/2008)) (Data Flagged as -1 for Optional Data)
 - In May of 2008, CDMO being requested that Reserves install a new MET Program (version 5.5) which captured daily cumulative precipitation readings (in addition to 15 minute precipitation totals). This version of the program was installed at Taskinas Creek on May 15th, 2008. Prior to that date, we did not collect cumulative precipitation as a parameter and so that data have been coded as “-1” or “optional data” from 00:15 on January 1, 2008 to 14:15 on May 23rd, 2008.
 - In addition, it was also a request by CDMO during this general time period that Max Wind Speed become a standard parameter which is ingested and coded by the NERRS macro. So, Max Wind Speed was not coded by the NERRS Macro until the May 23rd collection date, data for this parameter are coded as “-1” or “optional data” from the beginning of 2008 until May 23rd at 14:15.
8. Optional Data (Wind Direction Standard Deviation (from 1/1/2008 to 9/30/2008)) (Data Flagged as -1 for Optional Data)
 - During the fall of 2008, CDMO made an additional change to their database and begin “ingesting” this parameter (Wind Direction Standard Deviation). Due to this, the Wind Direction Standard Deviation parameter was not “ingested” and coded by the NERRS database and macros until the fourth quarter data submission of 2008. So, data for this parameter are coded as “-1” or “optional data” from the beginning of 2008 until 23:45 on September 30, 2008.