**Guana Tolomato Matanzas (GTM) National Estuarine Research Reserve (NERR)**

**Meteorological Metadata**January – December 2017

**Latest Update:** November 5, 2018

**I. Data Set and Research Descriptors**

**1) Principal investigator(s) and contact persons:**

Principal Investigator:

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**2) Entry verification:**

The meteorological data are collected and stored on a Campbell Scientific CR1000 datalogger. The Centralized Data Management Office (CDMO) Data Logger Program (gtmpcmet\_5.5\_062515.CR1) controls the sensors, performs all data manipulations, and interfaces the CR1000 with the PConnect or LoggerNet software supplied by Campbell Scientific.

Once a month data are downloaded from the CR1000 using a laptop or tablet personal computer (historically a Palm Pilot m105 using PConnect). All files are exported from Loggernet and the data are saved as raw data files in a comma-delimited format with a gtmpcmetmmddyy.dat naming convention that represents the site name, weather station, and the first day data are recorded into the file (e.g., gtmpcmet012317.dat represents a data file with its first row of data obtained on January 23, 2017). These data files are uploaded to the CDMO where they undergo automated primary QAQC and become part of the CDMO’s online provisional database. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the Reserve where it is opened in Microsoft Excel and processed using the CDMO’s NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, 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. For more information on QAQC flags and QAQC codes, see Sections 11 and 12.

Flagged and/or anomalous data are evaluated. Data outside the “normal” range of the instruments are investigated for validity based on field observations, QC checks, graphs, and instrument diagnostics. Data are rejected if the anomalies are attributed to sensor malfunction. Any additional information on flagged data is noted in Section 13 Other Remarks/See Metadata (CSM). Common errors observed are relative humidity greater than 100% and precipitation difference of greater than 25 mm in 15 minutes. Both raw data files and QAQC files are archived on the CDMO FTP server. Katie Petrinec and Shannon Dunnigan are responsible for these tasks.

**3) Research objectives (Campbell Weather Station)**

The principal objective is to record and ultimately integrate meteorological data with water quality and biological data to better understand the variability, trends, and relationships of these parameters within the GTMNERR.

**4) Research methods**

Campbell Scientific data telemetry equipment was installed at the Pellicer Creek (PC) station on 06/19/2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B01B60E. 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](http://cdmo.baruch.sc.edu/).

Data are collected in Eastern Standard Time (EST) for the entire year.

The 15-minute data are collected in the following formats for the CR1000:

**Averages from 5-second data:**

Air Temperature (°C), Relative Humidity (%), Barometric Pressure (mb), Wind Speed (m/s), Wind Direction (degrees), Battery Voltage (volts)

**Maximum, Minimum, and their times from 5-second data:**

Maximum and Minimum Air Temperature (°C) and their times (These data are not available in the dataset, but are available from GTM NERR)

Maximum Wind Speed (m/s) and time

Wind Direction Standard Deviation (degrees)

**Totals:**

Precipitation (mm), PAR (millimoles/m2), and Cumulative Precipitation (mm) (Cumulative precipitation is no longer available via export from the CDMO. Please contact the Reserve or the CDMO for more information or to obtain these data.)

Recommended calibration frequency for the MET station sensors:

* Temperature/Humidity – yearly recalibration
* Rain Gauge – yearly recalibration
* Wind Speed/Direction – yearly or every 2 years inspection (depending on the sensor)
* Barometric Pressure – every 2 years recalibration
* PAR – every 2 years recalibration
* CR1000 – every 5 years (required beginning 2014, one year initial grace period)

The CR1000 internally stores up to 2 MB of programs and data. A maximum four-week sampling interval (i.e., time between data downloads) is used to avoid losing data in the CR1000 and to provide for regular inspection and maintenance of the station.

At each visit to the station, sensor performance (i.e., temperature, relative humidity, barometric pressure, and wind speed) is checked by comparing weather station values to those of a handheld Kestrel 4000 wind/weather instrument. All sensors are inspected for damage or debris, and repaired and cleaned accordingly following the download of data. The surfaces of the Apogee Sensor and Vaisala Temperature and Relative Humidity Sensor are cleaned at each visit using a paper towel moistened with deionized water. With the exception of the rain gauge (which is calibrated in-house), all sensors are removed and sent to Campbell Scientific for re-calibration yearly or every two years.

**5) Site location and character**

The GTMNERR (North section [NW and SE corners]: 30.1632º N, 81.3447º W and 29.9698º N, 81.2488º W; South section: 29.8295º N, 81.3294º W and 29.6017º N, 81.1936º W), located in the Florida upper east coast drainage basin, includes over 24,281 ha of publicly owned forested uplands, tidal wetlands, estuarine lagoons and offshore seas. Geographically separated by the greater St. Augustine area, the Reserve is associated with the riverine systems of the Tolomato and Guana River estuaries to the north and the Matanzas River estuary to the south.

The climate of northeast Florida is classified as humid subtropical and is characteristic of the Gulf and Atlantic coastal plain of the southeastern United States. Average annual rainfall is approximately 52 inches (132 cm) per year, with the wet season extending from June through September. Seasonal variation in temperature within the Reserve follows that of rainfall with a summer period of high temperatures between June and September and a cooler period extending from December through March. Annual mean air temperature within the Reserve is approximately 21°C.

The weather station is located on a 1.8 square meter wooden deck built 1.3 meters above a sand flat in a high marsh region at the mouth of Pellicer Creek (29º 39′ 28.08 N, 81º 13′ 58 W). The height of the deck approximates the maximum height of the patchy mangrove vegetation immediately seaward of the station. With the exception of the rain gauge, which is located away from the tower on the SE corner of the platform, all sensors are mounted on a 3-m aluminum tower secured to the wooden deck following the descriptions outlined in the NERR System-Wide Monitoring Program Campbell Scientific CR10X-2M Based Meteorological Monitoring Station Standard Operating Procedures V 1.0.

Sensor Heights in Meters (m) from Deck (from Ground)

* Temperature and Humidity: 2.0 m (3.3 m)
* LiCor PAR: 3.0 m (4.3 m) Dates: 09/25/2002 10:15 – 10/06/2010 11:00
* LiCor PAR: 2.8 m (4.1 m) Dates: 10/06/2010 15:15 – current as of 12/31/2017
* Barometric Pressure: 1.0 m (2.3 m)
* Rain Gauge: 0.9 m (2.2 m)
* Wind Monitor: 3.1 m (4.4 m)

The area surrounding the Pellicer Creek weather station is considered fairly pristine. Pellicer Creek is a state-managed Aquatic Preserve bordered for much of its length by publicly-owned conservation lands. The weather station is approximately 4 km SE of the Pellicer Creek water quality and nutrient monitoring station. Marsh vegetation transects are also in close proximity.

SWMP Station Timeline:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Station Code | Station Name | SWMP Status | Location | Active Dates | Reason Decommissioned | Notes |
| GTMPCMET | Pellicer Creek | P | 29° 39' 28.08N,  81° 13' 58 W | 09/01/2002 - | NA | NA |

**6) Data collection period**

The Campbell Scientific Weather Station has been operating at the Pellicer Creek (PC) station since September 25, 2002. The 2017 data collection period began on January 1, 2017 00:00 and ended on December 31, 2017 23:45.

|  |  |
| --- | --- |
| File Start Date and Time | File End Date and Time |
| 12/05/2016 10:30 | 01/23/2017 10:30 |
| 01/23/2017 10:30 | 02/20/2017 11:30 |
| 02/20/2017 11:30 | 03/20/2017 11:30 |
| 03/20/2017 11:30 | 04/03/2017 13:00 |
| 04/03/2017 13:00 | 05/02/2017 11:15 |
| 05/02/2017 11:15 | 06/13/2017 09:15 |
| 06/13/2017 09:15 | 07/11/2017 09:45 |
| 07/11/2017 09:45 | 08/17/2017 09:45 |
| 08/17/2017 09:45 | 09/27/2017 09:30 |
| 09/27/2017 09:30 | 10/11/2017 11:30 |
| 10/11/2017 11:30 | 12/05/2017 11:45 |
| 12/05/2017 12:00 | 01/12/2018 10:30 |

**7) Distribution**

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data.  The NERRS retains the right to be fully credited for having collected and process the data.  Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used.  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.

Requested citation format:

NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: <http://www.nerrsdata.org/>; *accessed* [fill in date].

NERR meteorological 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 [www.nerrsdata.org](http://www.nerrsdata.org).  Data are available in comma delimited format.

**8) Associated researchers and projects**

The GTMNERR has formed partnerships with other agencies and organizations actively involved in resource protection in the GTMNERR watershed. Cooperating managers of lands within the NERR include: 1) National Park Service, 2) St. Johns River Water Management District (SJRWMD),   
3) Department of Environmental Protection (DEP) Division of Recreation and Parks/Florida Park Service, 4) Florida Fish and Wildlife Conservation Commission, 5) Florida Division of Forestry, 6) St. Johns County, and 7) Flagler County.

The SJRWMD Northern Coastal Basin (NCB) Program, established in 1995, covers the watersheds along the Intracoastal Waterway from Ponce Inlet in Volusia County, north through Flagler and St. Johns Counties, to the Georgia border. This program was developed in response to concerns about the impacts of population growth and development on water quality in the NCB. Some of the major research activities conducted within the boundaries of the GTMNERR through the NCB program include hydrodynamic modeling; land use, emergent marsh vegetation, shoreline and oyster habitat mapping; and water quality monitoring. Many of the water quality monitoring and assessment activities of the NCB program are aimed at pollution source identification and the development of pollution load reduction goals.

To complement the weather station data, the GTMNERR also monitors water quality, nutrient (data available at [www.nerrsdata.org](http://www.nerrsdata.org)), and biological components of the estuary such as emergent vegetation, plankton, and bivalves. Biological data are available upon request.

For further information on the GTMNERR, see the Site Profile at: https://coast.noaa.gov/data/docs/nerrs/Reserves\_GTM\_SiteProfile.pdf

**II. Physical Structure Descriptors**

**9) Sensor specifications**

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

Sensor 1 Serial Number: X1710109

Date of Calibration: 06/03/2002

Dates of Sensor Use: 09/25/2002 – 03/02/2004

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 05/21/2002

Dates of Sensor Use: 03/02/2004 – 07/27/2004

Sensor 1 Serial Number: X1710109

Date of Calibration: 05/24/2004

Dates of Sensor Use: 07/27/2004 – 06/17/2005

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 06/01/2005

Dates of Sensor Use: 06/17/2005 – 09/20/2006

Sensor 1 Serial Number: T0920010 (replaced SN X1710109)

Date of Last Calibration: 08/03/2006

Dates of Sensor Use: 09/20/2006 – 08/24/2007

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 05/21/2007

Dates of Sensor Use: 08/24/2007 – 09/10/2008

Sensor 1 Serial Number: T0920010

Date of Last Calibration: 06/04/2008

Dates of Sensor Use: 09/10/2008 – 10/06/2009

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 09/15/2009

Dates of Sensor Use: 10/06/2009 – 10/06/2010

Sensor 1 Serial Number: T0920010

Date of Last Calibration: 08/31/2010

Dates of Sensor Use: 10/06/2010 – 10/31/2011

Sensor Retired on 10/31/2011

Sensor 2 Serial Number: X2120031

Sensor 2 Date of Last Calibration: 09/23/2011

Sensor 2 Dates of Sensor Use: 10/31/2011 – 10/31/2012

Sensor Retired on 10/31/2012

Parameter: Temperature

Units: Celsius

Sensor type: PT100 RTD, IEC 751 1/3 Class B

Model #: HC2-S3 Temperature and Relative Humidity Probe

Operating Temperature: -40°C to +60°C

Range: -40°C to +60°C

Accuracy: ± 0.1 °C @ 23°C

Sensor 2 Serial Number: 0060837710 (Replaced SN X2120031)

Date of Calibration: 07/24/2012

Date of Calibration: 06/07/2016

Dates of Sensor Use: 10/31/2012 – 10/22/2013

Dates of Sensor Use: 09/20/2016 – 09/27/2017

Sensor 1 Serial Number: 0061085380 (Replaced SN T0920010)

Date of Calibration: 03/14/2013

Date of Calibration: 05/11/2017

Dates of Sensor Use: 10/22/2013 - 10/13/2014

Dates of Sensor Use: 10/06/2015 – 09/20/2016

Dates of Sensor Use: 09/27/2017 – current as of 12/31/2017

Sensor 3 Serial Number: 0061046229

Date of Calibration: 07/12/2012\*

Dates of Sensor Use: 10/13/2014 - 10/07/2015

\*Brand new sensor (never used). Contacted Campbell Scientific to make sure factory calibration was still valid. They gave approval to deploy.

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: +/- 2% RH (0-90%) and +/- 3% (90-100%)

Temperature dependence of RH measurement: +/- 0.05% RH/°C

Sensor 1 Serial Number: X1710109

Date of Calibration: 06/03/2002

Dates of Sensor Use: 09/25/2002 – 03/02/2004

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 05/21/2002

Dates of Sensor Use: 03/02/2004 – 07/27/2004

Sensor 1 Serial Number: X1710109

Date of Calibration: 05/24/2004

Dates of Sensor Use: 07/27/2004 – 06/17/2005

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 06/01/2005

Dates of Sensor Use: 06/17/2005 – 09/20/2006

Sensor 1 Serial Number: T0920010 (replaced SN X1710109)

Date of Last Calibration: 08/03/2006

Dates of Sensor Use: 09/20/2006 – 08/24/2007

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 05/21/2007

Dates of Sensor Use: 08/24/2007 – 09/10/2008

Sensor 1 Serial Number: T0920010

Date of Last Calibration: 06/04/2008

Dates of Sensor Use: 09/10/2008 – 10/06/2009

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 09/15/2009

Dates of Sensor Use: 10/06/2009 – 10/06/2010

Sensor 1 Serial Number: T0920010

Date of Last Calibration: 08/31/2010

Dates of Sensor Use: 10/06/2010 – 10/31/2011

Sensor 2 Serial Number: X2120031

Date of Last Calibration: 09/23/2011

Dates of Sensor Use: 10/31/2011 – 10/31/2012

Retired on 10/31/2012

Parameter: Relative Humidity

Units: Percent

Sensor type: ROTRONIC® Hygromer IN-1

Model #: HC2-S3 Temperature and Relative Humidity Probe

Range: 0-100% non-condensing

Accuracy at 23°C: +/- 0.8% RH with standard configuration settings

Sensor 2 Serial Number: 0060837710 (Replaced SN X2120031)

Date of Calibration: 07/24/2012

Date of Calibration: 06/07/2016

Dates of Sensor Use: 10/31/2012 – 10/22/2013

Dates of Sensor Use: 09/20/2016 – 09/27/2017

Sensor 1 Serial Number: 0061085380 (Replaced SN T0920010)

Date of Calibration: 03/14/2013

Date of Calibration: 05/11/2017

Dates of Sensor Use: 10/22/2013 - 10/13/2014

Dates of Sensor Use: 10/06/2015 – 09/20/2016

Dates of Sensor Use: 09/27/2017 – current as of 12/31/2017

Sensor 3 Serial Number: 0061046229

Date of Calibration: 07/12/2012\*

Dates of Sensor Use: 10/13/2014 - 10/06/2015

\*Brand new sensor (never used). Contacted Campbell Scientific to make sure factory calibration was still valid. They gave approval to deploy.

Parameter: Barometric Pressure

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

Sensor 1 Serial Number: X035001

Date of Calibration: 01/18/2002

Dates of Sensor Use: 09/25/2002 – 07/27/2004

Sensor 2 Serial Number: X0350015

Date of Last Calibration: 01/18/2002

Dates of Sensor Use: 07/27/2004 – 09/20/2006

Sensor 1 Serial Number: X035001

Date of Calibration: 07/11/2006

Dates of Sensor Use: 09/20/2006 – 09/10/2008

Sensor 2 Serial Number: X0350015

Date of Last Calibration: 06/20/2008

Dates of Sensor Use: 09/10/2008 – 10/06/2010

Sensor 1 Serial Number: X035001

Date of Calibration: 09/07/2010

Dates of Sensor Use: 10/06/2010 – 10/31/2012

Sensor 2 Serial Number: X0350015

Date of Last Calibration: 09/25/2012

Dates of Sensor Use: 10/31/2012 – 10/15/2014

Parameter: Barometric Pressure

Units: millibars (mb)

Sensor type: Vaisala Barocap © silicon capacitive pressure sensor

Model #: CS-106 (PTB110)

Operating Range: Pressure: 500 to 1100 mb; Temperature: -40°C to +60°C;

Humidity: non-condensing

Accuracy: ± 0.3 mb @ 20°C; +/- 0.6 mb @ 0°C to 40°C; +/- 1 mb @ -20°C to 45°C; +/- 1.5 mb @ -40°C to 60°C

Stability: ± 0.1 mb per year

Sensor 3 Serial Number: H4960069

Date of Last Calibration: 12/19/2012\*

Dates of Sensor Use: 10/15/2014 – 09/20/2016

\*Brand new sensor (never used). Contacted Campbell Scientific to make sure factory calibration was still valid. They gave approval to deploy.

Sensor 4 Serial Number: J1160033

Date of Last Calibration: 06/08/2016

Dates of Sensor Use: 09/20/2016 – current as of 12/31/2017

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

Sensor 1 Serial Number: WM51298

Date of Calibration: 06/06/2002

Dates of Sensor Use: 09/25/2002 – 07/27/2004

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 06/06/2002

Dates of Sensor Use: Back-up Sensor

Sensor 2 Serial Number: WM51295

Date of Calibration: 05/17/2004

Dates of Sensor Use: 07/27/2004 – 09/20/2006

Sensor 1 Serial Number: WM51298

Date of Last Calibration: 08/14/2006

Dates of Sensor Use: 09/20/2006 – 09/10/2008

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 05/05/2008

Dates of Sensor Use: 09/10/2008 – 10/06/2010

Sensor 1 Serial Number: WM51298

Date of Last Calibration: 08/30/2010

Dates of Sensor Use: 10/06/2010 – 10/31/2012

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 09/14/2012

Dates of Sensor Use: 10/31/2012 – 06/25/2013

Sensor 3 Serial Number: WM126355

Date of Last Calibration: 5/21/2013

Dates of Sensor Use: 06/25/2013 – 09/30/2015

Sensor 4 Serial Number: WM126356

Date of Last Calibration: 5/21/2013

Dates of Sensor Use: 09/30/2015 – 10/11/2017

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 05/25/2017

Dates of Sensor Use: 10/11/2017 – current as of 12/31/2017

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

Sensor 1 Serial Number: WM51298

Date of Calibration: 06/06/2002

Dates of Sensor Use: 09/25/2002 – 07/27/2004

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 06/06/2002

Dates of Sensor Use: Back-up Sensor

Sensor 2 Serial Number: WM51295

Date of Calibration: 05/17/2004

Dates of Sensor Use: 07/27/2004 – 09/20/2006

Sensor 1 Serial Number: WM51298

Date of Last Calibration: 08/14/2006

Dates of Sensor Use: 09/20/2006 – 09/10/2008

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 05/05/2008

Dates of Sensor Use: 09/10/2008 – 10/06/2010

Sensor 1 Serial Number: WM51298

Date of Last Calibration: 08/30/2010

Dates of Sensor Use: 10/06/2010 – 10/31/2012

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 09/14/2012

Dates of Sensor Use: 10/31/2012 – 06/25/2013

Sensor 3 Serial Number: WM126355

Date of Last Calibration: 5/21/2013

Dates of Sensor Use: 06/25/2013 – 09/30/2015

Sensor 4 Serial Number: WM126356

Date of Last Calibration: 5/21/2013

Dates of Sensor Use: 09/30/2015 – 10/11/2017

Sensor 2 Serial Number: WM51295

Date of Last Calibration: 05/25/2017

Dates of Sensor Use: 10/11/2017 – current as of 12/31/2017

Parameter: Photosynthetically Active Radiation (PAR)

Units: mmoles m-2 (total flux)

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

Model #: LI190SB

Light spectrum waveband: 400 to 700 nm

Temperature dependence: 0.15% per °C maximum

Stability: <±2% change over 1 yr

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

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

Sensor 1 Serial Number: Q30811

Date of Calibration: 04/04/2002

Multiplier: 1.189389

Dates of Sensor Use: 09/25/2002 – 07/27/2004

Sensor 2 Serial Number: Q30812

Date of Last Calibration: 04/04/2002

Multiplier: 1.172542

Dates of Sensor Use: Back-up Sensor

Sensor 2 Serial Number: Q30812

Date of Calibration: 05/20/2004

Multiplier: 1.172542

Dates of Sensor Use: 07/27/2004 – 10/31/2006

Sensor 1 Serial Number: Q30811

Date of Last Calibration: 07/13/2006

Multiplier: 1.277492

Dates of Sensor Use: 10/31/2006 – 09/10/2008

Sensor 2 Serial Number: Q30812

Date of Last Calibration: 06/09/2008

Multiplier: 1.22821

Dates of Sensor Use: 09/10/2008 – 10/06/2010

Sensor 1 Serial Number: Q30811

Date of Last Calibration: 08/27/2010

Multiplier: 1.361537

Dates of Sensor Use: 10/06/2010 – 10/04/2012

Retired Sensor on 10/04/2012

Sensor 1 Serial Number: Q47769 (Replaced SN Q30811)

Date of Last Calibration: 05/16/2012

Multiplier: 0.851661

Dates of Sensor Use: 10/04/2012 – 10/13/2014

Sensor 3 Serial Number: Q49012

Date of Last Calibration: 12/18/2012\*

Multiplier: 1.094993

Dates of Sensor Use: 10/13/2014 – 06/25/2015

\*Brand new sensor (never used). Contacted Campbell Scientific to make sure factory calibration was still valid. They gave approval to deploy.

Parameter: Photosynthetically Active Radiation (PAR)

Units: mmoles m-2 (total flux)

Sensor type: anodized aluminum with cast acrylic diffuser

Model #: SQ-110 Apogee Quantum Sensor

Light spectrum waveband: 410 to 655 nm

Temperature response: 0.06 ± 0.06% per °C

Stability (Long-term Drift): <±2% change over 1 yr

Operating Temperature: -40°C to 70°C; Humidity: 0 to 100%

Cosine Response: 45° zenith angle: +/- 2%; 75° zenith angle: +/- 5%

Sensitivity: 0.2mV per µmol s-1 m-2

Sensor 1 Serial Number: 18030

Date of Last Calibration: March 2015

Multiplier: 0.025

Dates of Sensor Use: 06/25/2015 – 06/13/2017

Sensor 2 Serial Number: 18029

Date of Last Calibration: May 2017

Multiplier: 0.025

Dates of Sensor Use: 06/13/2017 – current as of 12/31/2017

Parameter: Precipitation (non-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

Sensor 1 Serial Number: 30469-402

Date of Last Calibration: 04/02/2002

Date of Last Calibration: 03/02/2004

Date of Last Calibration: 05/24/2005

Date of Last Calibration: 09/18/2006

Date of Last Calibration: 04/24/2007

Date of Last Calibration: 08/12/2008

Date of Last Calibration: 10/03/2012

Date of Last Calibration: 10/09/2014

Date of Last Calibration: 06/01/2017

Dates of Use: 09/25/2002 – 10/06/2009

Dates of Use: 10/04/2012 – 10/22/2013

Dates of Use: 10/13/2014 – 06/22/2016

Dates of Use: 06/13/2017 – current as of 12/31/2017

Sensor 2 Serial Number: 30230-202

Date of Last Calibration: 02/19/2002

Date of Last Calibration: 10/05/2009

Date of Last Calibration: 10/14/2010

Date of Last Calibration: 08/30/2011

Dates of Use: 10/06/2009 – 10/04/2012

Sensor 3 Serial Number: 55024-412

Date of Last Calibration: 02/11/2013

Date of Last Calibration: 05/19/2016

Dates of Use: 10/22/2013 - 10/13/2014

Dates of Use: 06/22/2016 – 06/13/2017

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.

Logger 1 Serial Number: 005198

Date of Last Calibration: 05/31/2006

Dates of Use: 06/19/2006 – 10/13/2014

Firmware Version: Std. 10 changed on 06/19/2006

Std. 19 changed on 06/03/2010

Program Version: gtmpcmet\_061806.CR1 (No Version #)

gtmpcmet\_3.0\_103006.CR1

gtmpcmet\_5.5\_041608.CR1

gtmpcmet\_5.5\_091008.CR1

gtmpcmet\_5.5\_101410.CR1

gtmpcmet\_5.5\_100412.CR1

gtmpcmet\_5.5\_110912.CR1

Logger 2 Serial Number: 56316

Date of Last Calibration: 03/25/2013

Dates of Use: 10/13/2014 – current as of 12/31/2017

Firmware Version: Std. 25 changed on 10/13/2014

Program Version: gtmpcmet\_5.5\_101314.CR1

gtmpcmet\_5.5\_101414.CR1

gtmpcmet\_5.5\_062515.CR1

**10) Coded variable definitions**

Sampling station: Sampling site code: Station code:

Pellicer Creek Weather Station PC gtmpcmet

**11) QAQC flag definitions**

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 System-Wide Monitoring Program 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**

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, but some comment codes (marked with an \* below) can be applied to the entire record in the F\_Record column.

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

SDG Suspect due to sensor diagnostics

SIC Incorrect Calibration Constant, Multiplier or Offset

SIW Incorrect Wiring

SMT Sensor Maintenance

SNV Negative Value

SOC Out of Calibration

SQR Data rejected due to QAQC checks

SSD Sensor Drift

SSN Not a Number / Unknown Value

SSM Sensor Malfunction

SSR Sensor Removed

Comments

CAF Acceptable Calibration/Accuracy Error of Sensor

CCU Cause Unknown

CDF Data Appear to Fit Conditions

CML Snow melt from previous snowfall event

CRE\* Significant Rain Event

CSM\* See Metadata

CVT\* Possible Vandalism/Tampering

CWE\* Significant weather event

**13) Other remarks/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.

**Note 1:** Small negative PAR values are within range of the LI-COR 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 values are automatically flagged and coded as <1> (CAF).

**Note 2:** Relative Humidity data greater than 100 are within range of the sensor accuracy of +/-3% and are flagged and coded as suspect, <1> (CAF). Values greater than 103 are rejected <-3>.

**Note 3:** Precipitation values greater than 5mm in a 15-minute time period may occur during some heavy rain events, therefore, these data were not rejected.

**Note 4:** Data recorded for all parameters (except for cumulative precipitation) at the midnight timestamp (00:00) are the 15 minute averages and totals for the 23:45 – 23:59 time period of the previous day. Cumulative precipitation data at the midnight timestamp (00:00) are the sum of raw (unrounded) precipitation data from 00:00 to 23:59 of the previous day. Summing each individual 15-minute total precipitation value from the same period will result in small differences from cumulative precipitation due to rounding. It is especially important to note how data the midnight timestamp are recorded when using January 1st and December 31st data. **Note: Cumulative precipitation is no longer available via export from the CDMO. Please contact the Reserve or the CDMO for more information or to obtain these data.**

1. **See Metadata [GSM]/(CSM)/{CSM}**

**February 1 - 28, 2017**

1. The rain gauge was found to be off level at the station visit on 02/20. Total and cumulative precipitations are coded as CSM from the previous station visit 02/01 09:00 through 02/20 11:30. Although the rain gauge was not level the data appear to be accurate and are not considered suspect**.**

**June 1 – 30, 2017**

1. Missing data 06/13 09:45 – 10:00; attributed to station power down. Installed newly calibrated precipitation and PAR sensors.
2. Reject all data 06/13 10:15; attributed to an incomplete 15-minute reading because of station power down.

**September 1 – 30, 2017**

1. Hurricane Irma influenced all data 9/10 00:00 through 9/13 00:00. F\_Record coded as significant weather event.
2. Reject all data 09/27 09:30 – 10:00; attributed to station power down. Installed newly calibrated temp/relative humidity sensor.
3. Nor’easter affected all data 09/30 05:45 through 10/07 00:00. Storm brought strong winds and heavy rainfall. F\_Record coded as significant weather event.

**October 1 – 31, 2017**

1. Missing data 10/11 12:00; attributed to station power down. Installed newly calibrated wind monitor.
2. Reject all data 10/11 12:15; attributed to an incomplete 15-minute reading because of station power down.

**November 1 - 30, 2017**

1. Nor’easter affected all data 11/23 04:45 through 11/25 00:00. Storm brought strong winds and heavy rainfall that caused localized flooding and prevented access to our weather station. F\_Record coded as significant rain event.

**December 1-31, 2017**

1. Reject air temperature and relative humidity 12/22 12:15 due to low minimum air temperature value (-39.6). Minimum air temperature data are not included in the dataset but are used for QAQC .

**b. Daily, Monthly, and Annual Precipitation Totals (from raw data. Note that raw values corrected to 0.0 in the QAQC file were not included in the raw totals.)**

Pellicer Creek Weather Station (gtmpcmet)

|  |  |
| --- | --- |
| **Date** | **Daily Precip. Totals (mm)** |
| 01/03/2017 | 2.032 |
| 01/06/2017 | 5.842 |
| 01/07/2017 | 20.066 |
| 01/14/2017 | 2.286 |
| 01/15/2017 | 0.254 |
| 01/22/2017 | 7.620 |
| 01/23/2017 | 1.524 |
| 01/29/2017 | 1.016 |
|  |  |
| **January Monthly Total** | **40.640** |
|  |  |
| 02/07/2017 | 9.398 |
| 02/08/2017 | 6.096 |
| 02/15/2017 | 3.048 |
| 02/18/2017 | 0.762 |
| 02/19/2017 | 1.016 |
| 02/22/2017 | 11.176 |
| 02/23/2017 | 3.302 |
| 02/25/2017 | 0.254 |
|  |  |
| **February Monthly Total** | **35.052** |
|  |  |
| 03/02/2017 | 3.556 |
| 03/04/2017 | 1.270 |
| 03/08/2017 | 2.540 |
| 03/12/2017 | 1.778 |
| 03/13/2017 | 21.336 |
| 03/14/2017 | 2.794 |
|  |  |
| **March Monthly Total** | **33.274** |
|  |  |
| 04/03/2017 | 3.810 |
| 04/04/2017 | 74.930 |
| 04/06/2017 | 1.270 |
| 04/19/2017 | 0.508 |
|  |  |
| **April Monthly Total** | **80.518** |
|  |  |
| 05/04/2017 | 3.302 |
| 05/05/2017 | 3.302 |
| 05/13/2017 | 0.508 |
| 05/21/2017 | 6.858 |
| 05/22/2017 | 5.334 |
| 05/23/2017 | 0.254 |
| 05/24/2017 | 4.064 |
| 05/31/2017 | 1.270 |
|  |  |
| **May Monthly Total** | **24.892** |
|  |  |
| 06/01/2017 | 22.098 |
| 06/02/2017 | 7.366 |
| 06/06/2017 | 39.116 |
| 06/07/2017 | 44.196 |
| 06/08/2017 | 4.318 |
| 06/12/2017 | 7.620 |
| 06/13/2017 | 4.064 |
| 06/14/2017 | 0.508 |
| 06/15/2017 | 9.398 |
| 06/16/2017 | 22.352 |
| 06/19/2017 | 1.016 |
| 06/24/2016 | 2.794 |
| 06/26/2016 | 50.292 |
| 06/27/2017 | 11.684 |
|  |  |
| **June Monthly Total** | **226.822** |
|  |  |
| 07/01/2017 | 10.922 |
| 07/02/2017 | 16.256 |
| 07/08/2017 | 21.082 |
| 07/09/2017 | 3.048 |
| 07/10/2017 | 2.286 |
| 07/17/2017 | 5.588 |
| 07/18/2017 | 1.016 |
| 07/22/2017 | 28.956 |
| 07/23/2017 | 5.588 |
| 07/24/2017 | 0.254 |
| 07/25/2017 | 0.254 |
| 07/29/2017 | 5.080 |
| 07/30/2017 | 27.940 |
|  |  |
| **July Monthly Total** | **128.270** |
|  |  |
| 08/03/2017 | 7.366 |
| 08/04/2017 | 3.302 |
| 08/05/2017 | 0.254 |
| 08/07/2017 | 2.286 |
| 08/08/2017 | 9.652 |
| 08/09/2017 | 1.016 |
| 08/10/2017 | 0.254 |
| 08/12/2017 | 71.882 |
| 08/13/2017 | 28.956 |
| 08/14/2017 | 21.336 |
| 08/16/2017 | 3.048 |
| 08/17/2017 | 3.302 |
| 08/27/2017 | 7.112 |
| 08/28/2017 | 8.382 |
| 08/29/2017 | 8.890 |
| 08/30/2017 | 0.254 |
| 08/31/2017 | 16.002 |
|  |  |
| **August Monthly Total** | **193.294** |
|  |  |
| 09/01/2017 | 8.128 |
| 09/02/2017 | 3.302 |
| 09/03/2017 | 0.254 |
| 09/06/2017 | 0.762 |
| 09/08/2017 | 25.400 |
| 09/09/2017 | 7.366 |
| 09/10/2017 | 167.893 |
| 09/11/2017 | 53.594 |
| 09/12/2017 | 0.762 |
| 09/22/2017 | 4.826 |
| 09/23/2017 | 8.128 |
| 09/30/2017 | 111.506 |
|  |  |
| **September Monthly Total** | **391.921** |
|  |  |
| 10/01/2017 | 104.140 |
| 10/02/2017 | 2.032 |
| 10/03/2017 | 0.508 |
| 10/05/2017 | 19.812 |
| 10/06/2017 | 30.988 |
| 10/08/2017 | 2.794 |
| 10/09/2017 | 0.508 |
| 10/10/2017 | 2.540 |
| 10/13/2017 | 0.508 |
| 10/14/2017 | 1.524 |
| 10/15/2017 | 0.508 |
| 10/16/2017 | 21.082 |
| 10/17/2017 | 18.796 |
| 10/18/2017 | 1.524 |
| 10/19/2017 | 4.318 |
| 10/20/2017 | 1.778 |
| 10/21/2017 | 0.254 |
| 10/22/2017 | 2.286 |
| 10/23/2017 | 11.684 |
| 10/28/2017 | 5.080 |
| 10/29/2017 | 0.254 |
|  |  |
| **October Monthly Total** | **232.918** |
|  |  |
| 11/11/2017 | 8.636 |
| 11/21/2017 | 0.508 |
| 11/23/2017 | 102.108 |
| 11/24/2017 | 20.320 |
|  |  |
| **November Monthly Total** | **131.572** |
|  |  |
| 12/07/2017 | 3.048 |
| 12/08/2017 | 12.700 |
| 12/09/2017 | 13.462 |
| 12/21/2017 | 1.270 |
| 12/28/2017 | 1.778 |
|  |  |
| **December Monthly Total** | **32.258** |
|  |  |
| **January – December Total** | **1551.371** |