Tijuana River (TJR) National Estuarine Research Reserve Meteorological Metadata
January - December 2008
Latest Update: January 2, 2013

I. Data Set & Research Descriptors

1) Principal investigator(s) & contact persons

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2) Entry verification

Data are uploaded from the CR1000 datalogger to a Personal Computer (IBM compatible). Files are exported from PC208W or LoggerNet in a comma-delimited format and 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 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.

Michelle Cordrey is responsible for meteorological data management.

3) Research objectives (Campbell Weather Station):

The principal objective is to record long-term and episodic meteorological data for the Tijuana Estuary in order to observe any environmental changes or trends over time. Data are also used as corollary information in ongoing biologic, hydrologic and geographic studies being conducted at the reserve.

4) Research Methods

A model cr1000 Cambell Scientific datalogger samples meteorological sensors every 5 seconds. At 15 minute intervals averages or instantaneous readings are taken, depending upon sensor type, and written to a storage table on the cr1000.

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:

Air Temperature (°C)(not included in the dataset but are available from the TJR NERR), Wind Speed, (m/s)(not a standard parameter until 2008), Wind Direction Standard Deviation (degrees) from 5-second data (not a standard parameter until 2008)

Totals: Precipitation (mm), PAR (millimoles/m^2) and cumulative precipitation (mm) (not a standard parameter until 2008)

Monthly, 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 minimum of every two years. There were no other analyses done on the meteorological data at present.

Campbell Scientific data telemetry equipment was installed at the Tidal Linkage station on 06/12/2006 and transmits data to the NOAA GOES satellite, NESDIS ID #3B01468A. 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.

Site location and character:

The Tijuana River NERR is located on the Southern Pacific Coast, next to the California border with Mexico at a latitude of 32 deg. 34 min. N and Longitude of 117 deg. 07 min. W. The area surrounding the 2,531 acre reserve is heavily developed by residential housing as is the watershed which drains into the estuary. Approximately 2/3 of the watershed is in Mexico and is subject to periodic raw sewage outflows. The North Eastern section of is bordered by a military helicopter training base. Vegetation in the area is dominated by common pickleweed (Spartina virginica) and Pacific cordgrass (Spartina foliosa).

Description of the specific sampling station:

The weather station is located approximately 30m west of the TR NERR Visitor Centor at a Latitude of 32deg 34min 28.32sec N and a Longitude of 117deg 07min 37.05sec W. The station is 50m north of the water quality sampling station. The vegetation surrounding the weather station are mainly upland scrub species.

The anemometer, wind direction and Licor sensors are located at the top of a 3.5 meter aluminum tower. The temperature and humidity sensors are located midway up (1.75m) and on the west side of the tower. The barometric pressure sensor is mounted in the CR1000 enclosure at a height of 1.5m. The Tipping Bucket rain gauge sits on a separate 2 meter high pole located approx. a meter to the west of the main tower. It is above the ground to limit interference from the security fence surrounding the weather station. The sensors were wired to the cr1000 following the protocol in the CDMO Manual.

5) Data collection Period

Weather data collection began at the Tidal Linkage station in 1999 and has been operational since. Data was collected for the entire year of 2007 from 1/01/2007 00:00 through 12/31/2006 23:45.

6) Distribution

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.

7) Associated researchers and projects

The Tijuana River NERR has a water quality station located at the Tidal Linkage. The principal objective of this study is to record long-term water quality data for the Tijuana Estuary in order to observe any physical changes or trends in water quality both spatially and over time. Additionally, NERR SWMP tier 1 nutrient monitoring is being conducted at the Tidal Linkage station. Dr. Eric Terrell at Scripps Institute of Oceanography has been utilizing the meteorological data as ancillary data for a met station they have located on the Imperial Beach pier.

8) Sensor specifications

Parameter: LI-COR Quantum Sensor
Units: mmoles m-2 (total flux)
Sensor type: High stability silicon photovoltaic detector (blue enhanced)
Model#: LI190SA
Serial#: Q9301
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
Date of last calibration: September 11, 2003

Dates in service: 1/1/2007 – 12/31/2007

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 05103-5 Wind Monitor
Range: 0-60 m/s (130 mph); gust survival 100 m/s (220 mph)
Accuracy: +/- 2%
Date of last calibration: September 03, 2003
Dates in service: 1/1/2007 – 12/31/2007

Parameter: Wind direction
Units: degrees
Sensor type: balanced vane, 38 cm turning radius
Model#: R.M. Young 05103-5 Wind Monitor
Range: 360° mechanical, 355° electrical (5° open)
Accuracy: +/- 5%
Date of last calibration: September 03, 2003
Dates in service: 1/1/2007 – 12/31/2007

Parameter: Temperature and Relative Humidity
Model#: HMP45AC
Serial#: Y4410095
Operating Temperature: -40 to +60°C
Temperature Measurement Range: -40 to +60°C
Temperature Accuracy: ± 0.2 °C (20°C)
Relative Humidity Measurement Range: 0-100% non-condensing
RH Accuracy: +/-2% RH (0-90%) and +/-3%(90-100%)
Date of last calibration: October 28, 2003
Dates in service: 1/1/2007 – 12/31/2007

Parameter: Barometric Pressure
Model#: PTB101B
Serial#: P4830024
Operating Temperature: -40 to +60C
Pressure Measurement Range: 600-1060 mb
Humidity: non-condensing
Accuracy: ±0.5 to 6.0 mb (+20-60C)
Stability: ± 0.1 mb per year
Date of Last calibration: October 4, 2005
Dates in service: 01/01/2007 – 12/31/2007

Parameter: Precipitation
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: August 2, 2007 (prior calibration was June 12, 2006)
Dates in service: 01/01/2007 – 12/31/2007

Datalogger: Model: CR1000
Specs: The CR1000 has two MB 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) is 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.
Dates in service: 7/12/2006 – 12/31/2007

9) Coded vaiable definitions

Sampling station:	Sampling site code:	Station code:
Tidal Linkage	TL	tjrtlmet

10) 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	Open - reserved for later flag
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

11) 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 deployment or 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
GMT	Instrument Maintenance
GPF	Power Failure / Low Battery
GQR	Data Rejected Due to QA/QC Checks
GPR	Program Reload
GPD	Power Down

Sensor Errors

SIC	Incorrect Calibration Constant, Multiplier or Offset
SSN	Not a Number / Unknown Value
SNV	Negative Value
SOC	Out of Calibration
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

12) 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.

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. Relative Humidity data greater than 100 are within range of the sensor accuracy of +/-3%.

CDMO edits 11/2/2012:
The Atemp/R, PAR and wind sensor are past due for calibrations and as a result ATemp, RH, and wind data are flagged as suspect <1> SOC CSM for all of 2007 PAR data are also considered suspect for the entire year, but most of the PAR data were already flagged as rejected or flagged as suspect for other reasons. Listed below are the recommended calibration frequencies for the MET sensors along with their actual calibration dates:

Sensor	Calibration Frequency	Last calibration date
Atemp/RH	1 yr	October 28, 2003
Wind Speed/Direction	2 yr	September 3, 2003
PAR	2yr	September 11, 2003

From 1/1/2007 00:00 to 6/1/2007 05:45 PAR data were rejected due to a sensor/program malfunction.

From 6/1/2011 06:00 to 9/30/12:00 all nighttime data were rejected due to elevated values. Daytime data during this time period were retained; however, they were flagged as suspect. Estimated sunrise and sunset times (http://www.sunrisesunset.com/calendar.asp)were used to determine when best to flag the data as rejected or suspect. Only sunrise and sunset times were used to determine how to flag the data, weather conditions at the time were not taken into account. The PAR data flagged as suspect are best used for trend analysis and should not be considered to have accurate values.

From 10/01/2007 10:45 to 12/31/2007 23:45 PAR values were much lower than expected. These data were rejected. No cause has been determined.

From 08/02/2007 14:00 to 11/10/2007 13:30 total precipitation values were rejected due to corrosion at the tipping bucket sensor terminals that caused erroneous data to be recorded. Sensor was rewired, contacts were cleaned and function of bucket was tested.

On 10/01/2007 11:07 loaded version 4 of CDMO cr1000 program named:
TJRTLMET_VER4_062107.CR1 after downloading data.