

Tivoli Bays Meteorological Metadata  
Latest Update: January, 2012

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**Distribution**

HRECOS requests that attribution be given whenever HRECOS material is reproduced and re-disseminated and the HRECOS Coordinator be contacted prior to publications including any part of the data.

The National Estuarine Research Reserve, which operates this station, also requires compliance with the NOAA Ocean and Coastal Resource Management Data Ownership and Dissemination Policy for the NERRS System-wide National Monitoring Program ([cdmo.baruch.sc.edu/data/policy.cfm](http://cdmo.baruch.sc.edu/data/policy.cfm)).

**Entry Verification:**

Data collection and verification were performed according to the HRECOS Quality Management Plan and the HRECOS Estuary Stations Quality Assurance Project Plan. Both are available at [www.hrecos.org](http://www.hrecos.org). This station is quality level B; the data is verified once per quarter.

**Site Location and Character:**

The Tivoli weather station is located at the Bard College Field Station in Annandale, NY (42°01'05.46"N 73°55'01.13"W) and monitors Air Temperature, Barometric Pressure, Radiation, Rainfall, Relative Humidity, Wind Direction, Wind Gust, and Wind Speed. A 30 foot, aluminum tower is used to elevate some of the weather monitoring equipment. The tower is on the deck of an office building, on the west side, 9 feet off the ground. The wind anemometer, wind speed, and light sensors are located at the top of the tower, 39 feet off the ground. The datalogger and the barometric pressure sensor are enclosed within a fiberglass case attached to the tower, 12 feet off the ground. A heated rain gauge is next to the tower, attached to the building, 16 feet off the ground. The temperature/humidity sensor is next to the tower, attached to the deck handrail, 12 feet off the ground. GOES telemetry equipment includes a larger solar panel and battery, a larger enclosure to house the battery, a Campbell TX-312 transmitter, associated GPS for time synchronization and a Yagi antenna. Although trees surround the area, the tree line begins approximately 60 feet from the tower in most directions. The trees are at similar heights to the tower, but the sensors are not shaded at that location. The tower is approximately 1.2 miles southeast of the Tivoli South Bay water quality monitoring station, and 2.3 miles southeast of the Tivoli North Bay water quality monitoring station.

Tivoli Meteorological Station is located within the NYS DEC Tivoli Bays Wildlife Management Area and within the boundary of the Hudson River National Estuarine Research Reserve. Permission for research work can be obtained through Nathan Ermer, Manager of Tivoli Bays Wildlife Management Area ([nmermer@gw.dec.state.ny.us](mailto:nmermer@gw.dec.state.ny.us), 845-256-3047)

**Data Collection Period:**

Weather data have been collected at the Field Station at Tivoli Bays since July 1999. Weather data were collected for the entire year in 2007.

**Other Remarks / Notes including data coded as “see Metadata”**

- 04/23/10 15:30 – 16:00 Powered down system to install new operating system (OS 19). The data during this time period is missing.
- 04/23/10 16:15 – 5/26/10 10:15 New OS caused a malfunction in the calibration constant for the PAR sensor. The data during this time frame is to be rejected due to inaccuracy. New program and calibration constant corrected issue.
- 5/26/10 16:30 Powered down system in order to install new program; information is missing for this data point.
- 12/08/10 10:45 – 12/31/10 23:45 The system was powered down and a new program was uploaded. The program malfunctioned upon install and the PAR sensor did not function properly during this time period. The data is to be rejected due to inaccuracy

## Sensor Specification

General Information	Date first operational	7/15/99	Wind Speed		40°C to 60°C
	Date of first transmission	11/14/05		Sensor Type	18 cm diameter 4-blade helicoids propeller molded of polypropylene
	Data Logger Model	Campbell CR1000		Sensor Model	R.M. Young 05103 Wind Monitor
	Data Transmitter	Sutron Model #SL2-G312-1 geo-stationary satellite data transmitter		Units	meter per second (m/s)
	Collection Interval	15 min		Range	0-60 m/s (130 mph); gust survival 100 m/s (220 mph)
Temperature	Sensor Type	Platinum resistance temperature detector	Wind Direction	Sensor Type	balanced vane, 38 cm turning radius
	Sensor Model	HMP45C Temperature and Relative Humidity		Sensor Model	R.M. Young 05103 Wind Monitor
	Units	Celsius		Units	degrees
	Operating temperature	-40°C to +60 °C		Range	360° mechanical, 355° electrical (5° open)
	Range	-40°C to +60 °C		Accuracy	±5%
	Accuracy	± 0.2 °C @ 20 °C		Radiation	Sensor Type
Relative Humidity	Sensor Type	Vaisala HUMICAP© 180 capacitive relative humidity sensor	Sensor Model		LI190SB
	Sensor Model	HMP45C Temperature and Relative Humidity	Units		mmoles m-2 (total flux)
	Units	Percent	Light Spectrum Waveband		400 to 700 nm
	Operating temperature	N/A	Temperature Dependence		0.15% per °C maximum
	Temperature Dependence	± 0.05% RH/°C	Stability		<±2% change over 1 yr
	Range	0 to 100% non-condensing	Operating temperature		-40°C to 65°C; Humidity: 0 to 100%
	Accuracy	at 20 °C: ± 2% RH (0-90%), ±3% RH (90-100%)	Sensitivity		typically 5 µA per 1000 µmoles s-1 m-2
	Barometric Pressure	Sensor Type	CS-105 Vaisala Barocap© silicon capacitive pressure sensor	Precipitation	Sensor Type
Sensor Model		#PTB101B	Sensor Model		TE525
Units		Millibars	Units		millimeters (mm)
Humidity		non-condensing	Rainfall per tip		0.01 inch
Range		Pressure: 600 to 1060 mb; Temperature: -40°C to +60°C	Range		Temperature: 0° to +/- 50°C; Humidity: 0 to 100%
Accuracy		± 0.5 mb @ 20°C; +/- 2 mb @ 0°C to 40°C; +/- 4 mb @ -20°C to 45°C; +/- 6 mb @ -	Accuracy		±1.0% up to 1 in./hr; +0, -3% from 1 to 2 in./hr; +0, -5% from 2 to 3 in./hr

**QAOC flag definitions:**

	Flag	Description
Automatic Data Flags	0	Acceptable data
	5	Data that demonstrate a dramatic increase or decrease from the previous value. This flag will be applied to all parameters except chlorophyll, radiation, rainfall, wind direction, and wind direction standard deviation where dramatic increases and decreases are expected. The boundaries for these flags are: <ul style="list-style-type: none"> <li>○ <math>x &gt; 3(\text{previous value})</math> for Acidity, Dissolved Oxygen, Water Level, Water Temperature, Barometric Pressure, and Absolute Pressure.</li> <li>○ <math>x &lt; 1/3(\text{previous value})</math> for Specific Conductivity, Salinity, and Relative Humidity.</li> <li>○ <math>x &gt; 10 + 3(\text{previous value})</math> for Turbidity, Wind Gusts, and Wind Speed.</li> <li>○ <math> x  &gt; 10 + 3(\text{previous value})</math> for Air Temperature</li> </ul>
	6	Flat lined data (20 or more repeated records of the same value). This flag will be applied to all parameters except specific conductivity, chlorophyll, radiation, and rainfall where flat lined data is expected. For the same reason, this flag will not be applied to salinity data from Norrie Point.
	30	Hydrological data outside three standard deviations of the seasonal mean. The seasons will be defined by the solstices and equinoxes.
	40	Hydrological data outside four standard deviations of the seasonal mean. The seasons will be defined by the solstices and equinoxes.
	100	Data outside the range of the instrument.
Added by Site Manager	0	Data determined to be acceptable after a final review by the site manager.
	10,000	Suspicious data according to a final review by the site manager
	20,000	Corrected Data
	500,000	Rejected data according to a final review by the site manager.
Added by HRECOS Coordinator	5,000	Data from instruments that exceed the post-deployment warning level as defined by the HRECOS quality management plan
	9,000	Data from instruments that exceed the post-deployment alarm level as defined by the HRECOS quality management plan

**QAQC Comment Code definitions:**

Comment Codes Added By Site Managers	General Errors	Hyd + Met	GIM	instrument malfunction	GPF	power failure/low battery	
			GIT	instrument recording error, recovered telemetry data	GQR	rejected due to QAQC checks	
			GMC	no instrument deployed due to maintenance/calibration	GSM	see metadata	
		Hyd	GIC	no instrument deployed due to ice	GOW	out of water event	
			GNF	deployment tube clogged/no flow			
		Met	GMT	instrument maintenance	GIM	program reload	
	GPD		power down				
	Sensor Errors	Hyd	SBO	blocked optic	SPC	post calibration out of range	
			STF	catastrophic temperature sensor failure	SSDN	sensor drift, record not corrected	
			SCF	conductivity sensor failure	SSDC	sensor drift, record corrected	
			SDF	depth port frozen	SSM	sensor malfunction	
			SDP	DO membrane puncture	SOW	sensor out of water	
			SDO	DO suspect	SSR	sensor removed (not deployed)	
			SIC	incorrect calibration/contaminated standard	STS	turbidity spike	
			SNV	negative value	SWM	wiper malfunction/loss	
			Met	SIC	incorrect calibration constant, multiplier or offset	SOC	out of calibration
		SNV		negative value	SSM	sensor malfunction	
		SSN		not a number/unknown value	SSR	sensor removed	
		Comments	Hyd	CAF	acceptable calibration/accuracy error of sensor	CRE	significant rain event
				CBF	biofouling	CSM	see metadata
				CCU	cause unknown	CTS	turbidity spike
				CDA	DO hypoxia <28 percent saturation	CWD	data collected at wrong depth
	CDB			disturbed bottom	CAP	depth sensor in water, affected by atmospheric pressure	
	CDF			data appear to fit conditions	CAB	algal bloom	
	CFK			fish kill	CVT	possible vandalism/tampering	
	CIP			surface ice present at sample station	CMC	in field maintenance/cleaning	
	CLT			low tide	CMD	mud in probe guard	
	CND			new deployment begins			
	Met		CAF	acceptable calibration/accuracy error of sensor	CSM	see metadata	
			CDF	data appear to fit conditions	CVT	possible vandalism/tampering	
		CRE	significant rain event				