New spread spectrum radios released

RF401, RF411, RF416 offer you a choice of three protocol settings

Campbell Scientific is releasing the RF401, RF411, and RF416 Spread Spectrum Radios to replace the RF400, RF410, and RF415 radios. The RF401 supports the 910 to 918 MHz range, the RF411 supports the 920 to 928 MHz range, and the RF416 supports the 2.45 to 2.46 GHz range. (For simplicity, throughout this article the term "RF401" will refer to the RF401, RF411, and RF416 radios, and the term "RF400" will refer to the RF400, RF410, and RF415 radios.)

RF400 and RF401 Differences

Our RF400 and RF401 are essentially the same radio except the RF401 has a choice of three protocol settings: "Transparent," "PB Aware," and "PB Node." By default, the RF401 is set to the "Transparent" protocol setting, which is the protocol used by the RF400 radios. RF401 radios can be used in existing RF400 networks by using the "Transparent" protocol setting.

The new protocol settings, "PB Aware" and "PB Node," facilitate PAKBUS® communications and are preferable when using PAKBUS

PAKBUS®-based radio networks, such as those that use the RF401, can telemeter data from remote sites to a central base station. Shown is a rural water network.

dataloggers. Both of these protocol settings use the RF PAKBUS Protocol, and can coexist in the same network. Radios set to "PB Aware" do not require a unique PAKBUS address. Radios set to "PB Node" must have a unique address, and can be set up as a standalone RF Router.

RF PakBus Protocol

The benefits of the RF PAKBUS Protocol include:

- Greater immunity to interference and RF collisions
- Ability to create standalone RF router/repeaters (up to 8 repeaters)
- Duty-cycling modes available when the network is composed of more than one RF hop (RF400 networks needed to be in "Always ON" mode)

Training courses offered for CSI dataloggers, software

Campbell Scientific offers comprehensive training courses on our dataloggers and software.

Visit www.campbellsci.com/training to see the current schedule, check availability, and register. These courses emphasize datalogger programming and

use "hands-on" exercises to reinforce concepts. Watch for our new two-day CR1000 short course designed to transition Edlog datalogger users to CRBasic and introduce PAKBUS® communications.

Course fees include a Training Manual and the use of a datalogger, computer, and

sensors. Lunch is provided on all course days, and there will be a tour of Campbell Scientific's facilities as time permits.

If you are interested in customized courses at your location, we'd be happy to arrange them. Contact an Applications Engineer for details.

Message from the President

Committed to support your data telemetry needs

By Paul Campbell

To better understand the direction of telemetry technology as it pertains to data retrieval using Campbell Scientific dataloggers, perhaps it is useful to consider the changes that we see occurring broadly in telecommunications. It used to be that all the service we needed or even thought we needed from a phone company was a dial tone. Whether for voice or for data, when we want access, we lift the receiver, wait for a dial tone, and then dial a number that addresses a remote phone or modem, which when answered, begins a two-way dialog that completely occupies all of the telemetry resource represented by the simultaneously connected ends and all points in between.

Ethernet and similar technologies introduced a means of simultaneous multi-point connection. This advance in communication electronics was leveraged through digital (and optical) electronics by organizing information into packets, each with a header containing a destination address that could then be routed and switched with the flexibility of different possible communication paths between source and destination. Internet Protocol (IP) became the standard of packet organization, routing, and decoding. Sophisticated switches and routers automate and optimize the passing of packets with such speed that reconstituted voice over IP sounds very nearly like a dedicated circuit. To the extent that packets in phone networks may be distinguished among voice, video, and data, for most users, data packets may be given a lower priority as in the case of text messaging on cellular phones. In the long run, such network architecture should be able to deliver data packets with greater reliability and at less cost.

For many years, Campbell Scientific has invested in technologies that improve the capability of data retrieval while maintaining compatibility with changes that occur in the telecommunications industry. In the U.S., different providers in the cellular market use competing standards. CSI now offers a modem for cellular networks using GPRS (General Packet Radio Service) technology. Other cellular networks in the U.S. use CDMA (Code Division Multiple Access) digital cellular standards that we are also able to access. Current and future efforts will improve our ability to deliver SMS (Short Message Service) packets over cellular networks. Our full range of telemetry products is explained at www.campbellsci.com/communications. Campbell Scientific affiliates offer telemetry peripherals suitable for their locale.

We have also been able to adopt some of the ideas used in broader networking to improve capabilities in our own private networks. This can be seen in the CR1000 with PakBus® routing capability. A significant improvement in the RF401 over the RF400 (cover article) is the implementation of PakBus routing capability. The RF401 takes advantage of a packet-switched architecture to automatically route packets to the desired destination, and to automatically retry in the event a packet doesn't make it. Diagnostics are improved to help identify the fault if packets are not getting through.

Campbell Scientific is committed to support you with the data telemetry means that best matches your need. Whether the technology is Internet, radio, or land-line based, it is likely we have the means to do the job.

Add four years to your warranty

For many of our dataloggers, measurement and control peripherals, and data retrieval peripherals, Campbell Scientific now offers a warranty extension—available only when the product is purchased. While we are not expanding the warranty coverage, purchasing a warranty extension adds four years to the product's standard warranty. For example, the warranty extension increases a three-year warranty to seven years, and a one-year warranty to five years. On our price lists, a "☆" indicates that the warranty extension is available for that product.

Under the warranty extension, products are warranted to be free from defects in materials and workmanship under normal use and service. Campbell Scientific's obligation is limited to repairing or replacing (at Campbell Scientific's option) defective products. The warranty extension will not apply to any product that has been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. Campbell Scientific is not liable for special, indirect, incidental, or consequential damages.

See the individual product manuals for complete product-specific warranty information.

New products placed on GSA price list

We have added four dataloggers— the CR1000, CR5000, CR9000XC, and CR9000X—to our GSA contract.

Additional products such as some of the CR9000X I/O modules, the CR1000KD, the CFM100, and our high data rate GOES satellite transceiver are also available.

Refer to our GSA contract number GS-25F-6042D for pricing.

Introducing the CR295 GOES DCP datalogger — it's TX312 compatible

Our latest addition to the CR200-series datalogger line is the CR295, specifically designed to work with the TX312 GOES satellite transmitter. When only a couple of measurement channels are needed in a GOES application, the CR295's low cost and simplicity make it a perfect fit.

The CR295 includes the same sensor inputs as the CR200: one SDI-12 port, five single-ended analog inputs, and two pulse channels. An RS-232 port was added to communicate with the TX312. Inclusion of GOES transmitter instructions in the CR295's firmware required removal of instructions for both radio telemetry and calculation of evapotranspiration.

The CR295 can read, record, and transmit information (i.e., latitude, longitude, elevation, and time) from the TX312's embedded GPS receiver. Diagnostics can be retrieved from the TX312 transmitter and included in the data stream.

The CR295 is programmed using the CRBasic editor, which is included in our LoggerNet and PC400 software. PocketPC support software, GoesDCP, is planned for release in late summer 2005. GoesDCP will support program generation, transmitter setup and diagnostics, data collection and automatic offset adjustment.

Input module ready for CR9000(X)

Campbell Scientific has released a new CR9000(X) I/O Module, the CR9052IEPE. This Filtered Analog Input Module and FFT Spectrum Analyzer for IEPE sensors is similar to the CR9052DC.

The CR9052IEPE and CR9052DC use the same motherboard, which includes a high-performance anti-alias filter, a Fast Fourier Transform (FFT) spectrum analyzer, and six analog differential channels. The daughterboards are different, allowing the modules to measure different sensor types. The CR9052IEPE's daughterboard provides current source excitation and ac coupling for direct connection and measurement of Internal Electronics Piezo-Electric (IEPE) accelerometers and microphones.

An on-board 34 V, high efficiency, low noise, charge pump power supply provides a constant current excitation of 2 mA, 4 mA, or 6 mA eliminating the need for an dedicated external IEPE power supply.

CC640 Digital Camera perfect for harsh, remote locations

If you've ever wanted to take pictures from a remote location, Campbell Scientific Canada's CC640 Digital Camera is for you.

Designed to work in harsh, remote locations, the CC640 operates down to -40°C while using minimal power. The camera can store JPEG images on a CompactFlash® card, or send them to a Campbell Scientific datalogger via PAKBUS. The CC640 can function independently in a self-timed mode, or can be triggered by applying a 5 V signal. Three communication ports (RS-232, RS-485, CS I/O) and a video output facilitate transfer of images to a datalogger, a TV monitor, or an off-site computer.

The CC640 Digital Camera operates in temperatures down to -40°C using minimal power.

PConnectCE 2.0 adds PAKBUS® support

In April, Campbell Scientific released PConnectCE version 2.0. The software allows you to communicate with your datalogger in the field and collect data, check measurements, check or set the clock, send or retrieve programs, and send commands to the datalogger in terminal mode using a Pocket PC/Windows Mobile™ 2003-based device.

PConnectCE 2.0 adds support for PAKBUS® communications used in our CR1000, CR200, CR10X-PB, CR510-PB, and CR23X-PB dataloggers and expands datalogger communication options. PConnectCE now supports more COM ports (previous versions supported only COM1 and COM2). Infrared communication has been added, which allows you to communicate with a datalogger using a PDA and our SC-IRDA infrared cable. Also, support for Bluetooth has been added to allow communication with a datalogger using a Bluetooth-enabled PDA and a third party Bluetooth to serial port adapter.

PConnectCE 2.0 includes a PDA-to-CS I/O connector (for communication with a datalogger over the CS I/O port), and a PDA-to-RS232 cable (for communication with a datalogger over the serial port). Owners of a previous version of PConnectCE can order an upgrade (PConnectCE/U) that includes the PDA-to-RS232 cable (upgrade customers

The new CS215: Accurate, stable measurements

Temperature and relative humidity probe

Manufactured by our European affiliate, Campbell Scientific Ltd., the CS215 Relative Humidity and Temperature Probe is now available to our customers. The CS215 uses a combined relative humidity and temperature element, the Sensirion SHT75, to provide accurate, stable measurements. The probe measures relative humidity from 0 to 100%, with an accuracy of ±2.0% from 10 to 90% RH. Temperature is measured from -40° to +70°C with an accuracy of ±0.4°C from +5° to +40°C.

The Sensirion SHT75 element is field-replaceable, eliminating the downtime often required for the recalibration process. The CS215 outputs an SDI-12 signal that our CR200-series, CR510, CR10X, CR1000, CR23X, and CR5000 can read.

Campbell Scientific, Ltd., manufactures the CS215 Relative Humidity and Temperature probe, shown above.

HMP50 RH & Temperature probe replaces the CS500

In June 2005, the HMP50 Temperature and Relative Humidity Probe replaced the CS500. The HMP50, manufactured by Vaisala, uses a 1000 Ohm platinum resistance thermometer (PRT) to measure air temperature for the range of -25° to 60°C, and the INTERCAP® capacitive chip to measure RH for the range of 0 to 98%. The chip is field-replaceable, eliminating the downtime often required for the recalibration process.

PConnectCE
Continued from Page 3

already have the PDA-to-CS I/O connector). Note that direct communication (communication other than IR or Bluetooth) requires that the PDA be capable of serial communication. Some entry level models do not offer this functionality. Carefully check the specifications for your PDA before ordering PConnectCE.
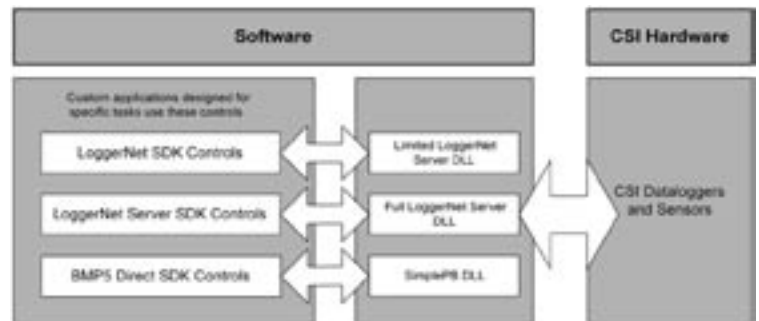
Software Development Kits enable customized data collection

Campbell Scientific customers have a variety of interests, including agriculture, weather, water resources, and vehicle testing. While LoggerNet's clients allow robust data collection and data display, customers with specialized measurement systems often need customized software clients and applications to enhance their specialized data acquisition systems. To enable the creation of customized data collection software, Campbell Scientific offers Software Development Kits (SDKs).

SDK controls play an intermediary role that simplifies the task of creating an application to communicate with a datalogger. SDK controls not only simplify the complex messaging layer but also provide a layer of insulation from future changes of the messaging protocol or the datalogger operating system. In addition, SDKs can be used to either create applications that extend existing Campbell Scientific software capabilities, or they can be marketed and distributed independently from other software packages offered by Campbell Scientific. Currently available SDKs are described below:

LoggerNet SDK contains five ActiveX controls and a limited LoggerNet communications DLL. A developer uses this SDK to create applications that remotely access a LoggerNet installation or applications that use the included LoggerNet communications DLL. The DLL only allows local client connections and is limited to direct communication using RS-232 or TCP/IP to a single datalogger. If you are creating an application that only extends the capabilities of an existing LoggerNet installation or only uses direct communication, this SDK is a great value. The purchase of this product includes one hour of support.

LoggerNet Server SDK is similar to the LoggerNet SDK but contains the full LoggerNet Server DLL. This DLL allows remote client connections and includes the software components necessary to communicate without limitations to Campbell Scientific dataloggers. Developers who want unlimited application control and operations to a datalogger network will want this package. The purchase of this product includes one hour of support.

BMP5 Direct SDK provides a quick and easy way to create an application that communicates with a single PAKBUS® datalogger using limited commands and a

Campbell Scientific TDR probe selection expanded

To measure water content and electrical conductivity over a wide range of soil textures and other physical conditions, Campbell Scientific now offers probes of three lengths for use with our TDR100 Time-Domain Reflectometer. New rod lengths of 7.5 cm and 15 cm join our currently available 30 cm probes. The CS640 and CS645 have 7.5 cm rod lengths and can be used in very high electrical conductivity soils or in laboratory column applications. The CS630 and CS635 have 15 cm rod lengths and provide larger sample volume for high conductivity soils. The CS605 and CS610 have 30 cm rod lengths and are used in typical soils where very large sample volume is required.

Each of the three rod lengths can be ordered with either a standard or low-loss cable. The standard RG58 cable is suitable for cable lengths up to 15 meters (50 feet). Either a low-loss Times Microwave LMR200DB or a low-loss RG8 is used for probes with cable lengths greater than 15 meters.

Probe Model	Rod Length	Cable Type	Maximum soil bulk electrical conductivity (deciSiemen/meter)
CS605	30 cm	RG58	1.5
CS610	30 cm	RG8	1.5
CS630	15 cm	RG58	4.5
CS635	15 cm	LMR200DB	4.5
CS640	7.5 cm	RG58	7.5
CS645	7.5 cm	LMR200DB	7.5

The CS300: A silicon-cell pyranometer for humid environs

Campbell Scientific has added the CS300 Apogee PYR-P Pyranometer to our product line. The manufacturer, Apogee Instruments, is located in Logan, Utah.

Silicon-cell pyranometers provide good accuracy for routine monitoring of shortwave radiation at an attractive price compared to thermopile pyranometers. Tests show the CS300's accuracy is comparable to other good-quality commercial silicon-cell pyranometers, ±5% in daily total radiation considering seasonal variation in sun angle and temperature. This compares to an

Industrial CF cards a better choice

With the release of the CFM100 CompactFlash® Memory Module, more of our customers will be using non-volatile CompactFlash (CF) memory cards for data storage. While several types and brands of CF cards are readily available, we advise that you carefully check product specifications before purchase, as card failure will result in both the loss of the card and its stored data.

Consumer-grade CF cards are cheaper than the industrial-grade memory cards we offer, and may perform adequately in laboratory and office conditions. However, consumer-grade cards do not function properly at industrial temperature ratings (-40° to +85°C), are more susceptible to failure during shock, and have shorter life spans (number of read/write cycles). For these reasons, Campbell Scientific recommends using industrial-grade cards for most applications.

Digital cellular modem eliminates delays

The Raven110 is a digital cellular modem manufactured by AirLink that communicates with a base computer via a General Packet Radio Service (GPRS) network and the Internet. Communicating via the Internet supports fast communication rates, eliminates dialing delays and long distance fees. Charges are accrued by the amount of data transmitted rather than airtime. The Raven110 is supported on the Cingular/AT&T network with both static and dynamic IP accounts.

Variety of new sensor mounts available

We have developed new sensor mounts for our aluminum CM110, CM115, and CM120 tripods. Crossarms are available in two-foot (CM202), four-foot (CM204), or six-foot (CM206) lengths.

The crossarms can be attached to the masts of our tripods or the legs of our towers. A right angle mounting bracket allows wind sensors to be attached to the end of the crossarms.

A magnetic mount for sensors with magnetic bases, an adjustable inclination mount for antennas, infrared sensors, and snow depth sensors, and a mounting stand for solar radiation sensors have also been added.

SDKs

direct RS-232 connection. An application created using the BMP5 Direct SDK can incorporate twelve basic commands to communicate with a PAKBUS datalogger. Developers creating applications for basic communication with a single PAKBUS datalogger may prefer this SDK because of its simplicity.

Visit www.campbellsci.com/downloads to obtain this SDK at no charge.

Radios
Continued from Page 1

- Reduced power consumption by the datalogger, as the radios perform "packet address filtering"
- Faster communications due to elimination of some of the small "link state packets"
- Automatic selection of the best RF path when there are parallel RF paths

Retry and Packet Acknowledgment Features

The RF401's packet acknowledgment and retry features provide a high degree of recovery from the inevitable RF packet collisions. Within an RF400 PAKBUS network, retries cannot be enabled because all radios have the same radio address, causing the RF acknowledgments to collide.

Hop Metric and Signal Strength

Our hop metric is based on signal strength, which allows the PAKBUS routing algorithms to automatically take the best route. This optimizes communications when a node has two RF routes— one route that has good signal strength on each of the hops and another route that is direct but has poor signal strength.

RF Routers

Radios with the "PB Node" protocol can be set up as a standalone RF Router. In this mode, the radio is not attached to any datalogger or PC; it is ONLY an RF router.

Configuring the RF401

You can configure the RF401 using software such as DevConfig version 1.2 or later, PAKBus Graph, or a user-supplied terminal emulator package such as HyperTerminal. DevConfig is bundled with our PC400 and LoggerNet software, or can be downloaded at no charge from our Web site.

When using either DevConfig or PAKBUS Graph, you can view and edit all of the PAKBUS settings. When using terminal emulation software, the radio's on-board Setup Menu is used to change the settings. The only PAKBUS setting that can be changed is the PAKBUS address.

Associated Equipment

The RF401 radios are compatible with the same antenna and power supply options as the RF400 radios. Antennas can be attached to a tripod or tower using the CM230 Adjustable Inclination Mount, which will accept antennas with 0.75" to 1.0" diameters.

CR206, CR211, and CR216

To reflect the change in the RF protocol, the CR205, CR210, and CR215 dataloggers will be replaced by the CR206, CR211, and CR216, respectively. Because the CR200-series dataloggers have always been PAKBUS devices, the changes are not as extensive as the changes to the spread spectrum radios. The dataloggers have a new setting that enables/disables the RF PAKBUS protocol and allows the datalogger to operate in either an RF400/CR205 or RF401/CR206 network.

Retrofitting the Radios

RF400 customers who use their radios in a PAKBUS network might consider upgrading their radios to RF401s. To upgrade a radio, an RMA is required.

CS300
Continued from Page 5

accuracy of ±2 to 3% for thermopile pyranometers. The CS300 is calibrated against a Kipp & Zonen model CM21 thermopile pyranometer and has a standard output of 0.2 mV per W m^{-2}, providing a signal of 200 mV in full sunlight (1000 W m^{-2}). This higher sensitivity permits use with our CR200-series dataloggers. The dome-shaped head sheds water buildup, a useful feature in high rainfall areas. The shape and composition of the domed diffuser achieves cosine correction to 80 degrees. The head is potted to eliminate internal condensation; the cable consists of shielded, individually insulated, twisted-pair wire jacketed in rugged Santoprene®. A 10 x 32 bolt (included) mounts the pyranometer to Apogee's leveling base, available as an option.

Specifications and calibration details are at www.apogeeinstruments.com.

CAMPBELL SCIENTIFIC CALENDAR

Date	Event	Location
August		
7-12	Ecological Society of America	Montreal, Quebec
17-19	CRWA Mini Conference and Exhibit	Grand Junction, CO
September		
25-28	Association of State Dam Safety Officials	New Orleans, LA
October		
9-13	SPE Annual Technical Conf. and Exhibit	Dallas, TX
16-19	Geological Society of America	Salt Lake City, UT
26-28	Automotive Testing Expo	Detroit, MI
26-29	USCID SCADA	Portland, OR
29- Nov. 2	WEFTEC	Washington, D.C.
November		
6-8	Irrigation Association Annual Meeting	Phoenix, AZ
6-10	ASA, CSSA, SSSA	Salt Lake City, UT
December		
5-9	American Geophysical Union	San Francisco, CA
January		
29- Feb. 2	American Meteorological Society	Atlanta, GA

Visit our web site for additional listings and training class schedules.

Campbell Scientific, Inc., real-time tools dedicated to helping coastal agencies

The Delaware Environmental Observing System

APPLICATION AT A GLANCE

Application type:
Meteorological Network

Project area:
Delaware, the Delmarva Peninsula, USA

Authors:
David R. Legates and Daniel J. Leathers, University of Delaware

Contracting agencies:
Delaware Emergency Management Agency

Datalogger(s):
Campbell Scientific CR10X

Communication links:
Landline phone, Internet

Measured/calculated parameters:
Air temperature, barometric pressure, relative humidity, precipitation, soil moisture, soil temperature, solar radiation, snow depth, water temperature, wave height and period, wind speed and direction.

DEOS sites span parts of three states and provide data for emergency management and environmental monitoring.

The Delaware Environmental Observing System (DEOS) is a real-time system dedicated to monitoring environmental conditions across the State of Delaware, the near-shore coastal waters and the Delaware Bay, and adjacent regions of Maryland, Pennsylvania, and New Jersey. DEOS is a tool for decision makers involved in emergency management, natural resource monitoring, agriculture, transportation, and other activities throughout the State of Delaware and the Delmarva Peninsula. It is a cooperative venture with a number of state and federal agencies and many of its visualization and analysis tools are designed to be adaptable outside Delmarva.

DEOS consists of:
• DEMON—the DEOS

Environmental Monitoring and Observing Network is a network of meteorological observation sites in and around Delaware.

• DIVAS—the DEOS Integrated Visualization and Analysis System integrates surface weather observations with NWS WSR-88D radar estimates of precipitation. This provides estimates of meteorological and environmental variables over a high spatial resolution grid using ESRI's ArcGIS 9 Server.

• DEOS Analysis Systems—provides easy access to data stored in an Oracle database, allowing informed decision making for a variety of environmentally sensitive areas.

DEMON integrates a number of meteorological and hydrological

Continued from Page 7

observation sites throughout Delaware and surrounding areas. Observations include both meteorological (e.g., wind vector, air temperature, precipitation, humidity, atmospheric pressure, soil moisture, and solar radiation) and hydrological variables (e.g., streamflow, water quality, tidal heights, well levels) with spatially interpolated fields of a number of observed and derived variables. Data are provided in real time to a number of state and federal agencies, including the National Weather Service.

DEOS stations have been installed in all three counties of Delaware as well as Chester County in Pennsylvania and Cecil County in Maryland. By the end of Summer in 2005, we will have 22 Campbell Scientific-based stations on-line through DEOS, the Delaware Solid Waste Authority, the Natural Estuarine Research Reserve, and the University of Delaware's Agricultural Cooperative Extension—all in a five county area.

Standard DEOS measurements are made with the following sensors:
- Air temperature and relative humidity—Vaisala HMP35C sensor
- Barometric pressure—Vaisala CS105 barometer
- Rainfall—Texas Electronics TE525 Tipping Bucket Rain Gage
- Soil temp erature—107 Water/Soil Temperature Probe
- Soil water potential—CS616 Water Content Reflectometer

Installing a new DEOS station increases the area covered by the network, and allows graduate students at the University of Delaware to gain experience working with meteorological equipment in the field.

DEOS coverage area and example of stations available for New Castle County, Delaware.

- Solar radiation—LI-COR LI200X Silicon Pyranometer
- Wind speed and direction—RM Young 03001 Wind Sentry Set or 05106 Marine Wind Monitor (coastal settings).

On some sites, we also have installed a 237 Wetness Sensing Grid and an SR50 CSC Ultrasonic Distance Sensor for snow depth measurement.
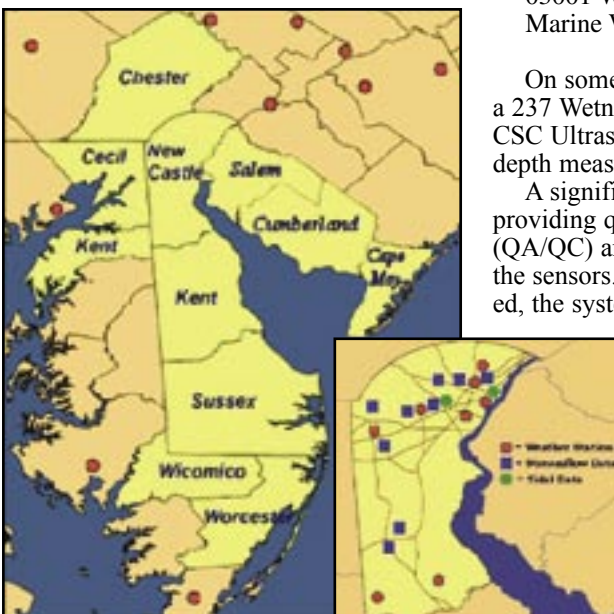
A significant effort is directed toward providing quality control and assurance (QA/QC) and preventive maintenance for the sensors. If a station failure is detected, the system contacts DEOS personnel.

DEOS provides more than data acquisition and dissemination. To date, the DEOS system has proven useful in a number of environmental applications. During the passage of tropical storms, nor'easters, or heavy snowfall, DEOS staff works with the Delaware Emergency Management Agency (DEMA) to provide up-to-date information on

developing weather events. DEOS can also alert state personnel and the 911 Center when exceptional conditions occur (e.g., heavy rainfall, high streamflow, excessive heat).

DEMA also uses DEOS data to assist with developing emergency management situations, such as toxic spills, hazardous chemical releases, and flash flooding events. The Delaware Department of Natural Resources and Environmental Control regularly uses DEOS data to provide information for pesticide management, mosquito control, and to schedule controlled burns of invasive plant species along the coast. The Delaware Solid Waste Authority and the Southeastern Chester County Refuse Authority have used the data to assist with refuse disposal activities. BP Solar has expressed interest in working with DEOS to test the durability of their solar panels for use in marine environments.

We hope that DEOS will become the highest resolution, most comprehensive state or regional environmental monitoring network available anywhere.