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# Solar800 Met Station for Solar Resource Assessment



As the need for renewable energy sources has increased, energy-generating sites using solar power have increased dramatically over the last decade. Before construction can begin, the project site's solar resources must be thoroughly assessed. A robust data set, including quantified and characterized solar data, is essential for project financing and engineering design.

The Solar800 is a system designed to measure meteorological conditions, including solar energy, at potential energy generating sites. It is a turn-key data-acquisition system built for quick deployment and ease of use. By assembling and programming the system in our production facilities, we give you the benefit of our efficiency, consistency, and standardization. No coding by the user is needed. The system ships with a quick-start guide to expedite the installation process, and with the Solar800 Configuration Utility software to configure data-retrieval options such as FTP, Modbus, and DNP3.

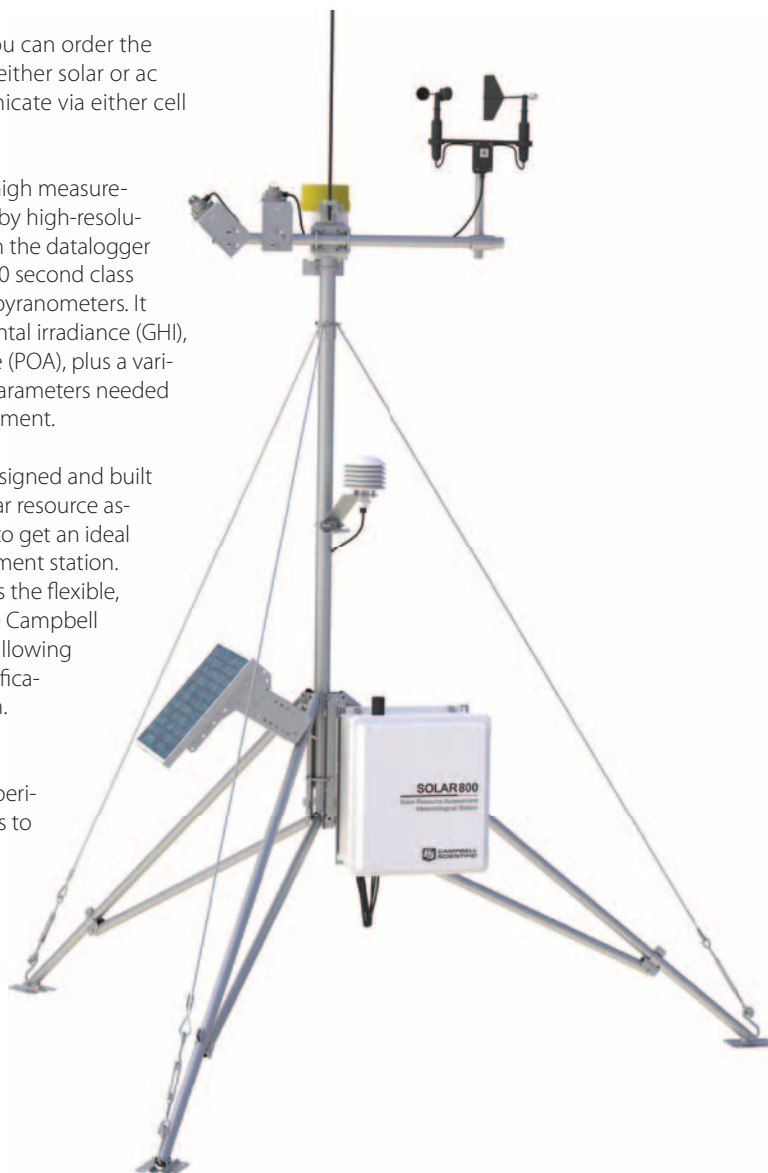
Our proven, reliable CR800 Measurement and Control Datalogger is at the core of the system. Like all Campbell Scientific dataloggers, the CR800 is powerful,

rugged, and flexible. You can order the system built to run on either solar or ac power, and to communicate via either cell modem or Ethernet.

The Solar800 provides high measurement quality, delivered by high-resolution analog channels on the datalogger combined with ISO 9060 second class or secondary standard pyranometers. It measures global horizontal irradiance (GHI), plane of array irradiance (POA), plus a variety of meteorological parameters needed for solar resource assessment.

Since the Solar800 is designed and built for general purpose solar resource assessment, you are sure to get an ideal solar resource measurement station. The system also features the flexible, modular qualities of the Campbell Scientific product line, allowing for advanced user modifications and customization.

Our Renewable Energy group has extensive experience working with users to design meteorological stations for solar energy, and can help you optimize this system for your application.



Learn More Here

[campbellsci.com/solar800](http://campbellsci.com/solar800)





# New HydroSense Product Available Soon

         New Product



The HS2P HydroSense II Pole, Campbell Scientific's newest HydroSense soil-water measurement product, facilitates both the insertion of the probe into the soil and its removal. The HS2P has an aluminum insertion pole that is lightweight, yet sturdy enough to handle repeated soil insertions and removals. Because the pole is used

from a standing position, there is no need to bend over to insert and then remove the probe for each measurement. In addition, the "T" design of the pole facilitates probe insertion into heavier soils.

The aluminum insertion pole has a mounting base for the HS2 handheld display as

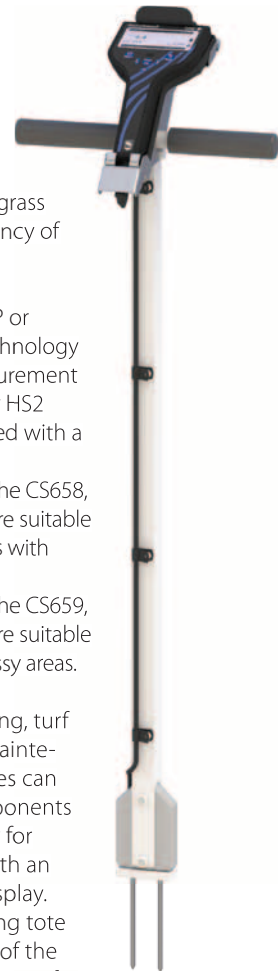
well as either of two volumetric water-content probes designed for the system. The HS2P probes (the CS658P and the CS659P) feature an insertion stop that minimizes the damage to turf grass and increases the consistency of the measurement.

The HS2P, with the CS658P or CS659P, uses the same technology and offers the same measurement capability provided by our HS2 handheld display combined with a CS658 or CS659 probe.

- The CS658P is similar to the CS658, having 20 cm rods that are suitable for measurements in soils with landscape materials.
- The CS659P is similar to the CS659, having 12 cm rods that are suitable for measurements in grassy areas.

Professionals in landscaping, turf grass, nursery, grounds maintenance, and other industries can purchase individual components of the HS2P system either for replacement or for use with an existing HS2 handheld display. Also available are a carrying tote for transport and storage of the HS2P, and a hard carrying case for the HS2 handheld display.

For more details and pricing information, contact Campbell Scientific.



## Two-Point Calibration Now a Line Item

         Product Update

The TEMPCAL2 two-point calibration service for Campbell Scientific thermistor-based products, previously offered on an as-requested basis, is now available as a standard line item. With this service, we test the thermistor-based product at high and low ends of a specified temperature range and

provide an NIST-traceable calibration sheet that specifies the sensor's response. The standard two-point calibration determines offsets at 30°C and 65°C with an uncertainty of  $\pm 0.05^\circ\text{C}$ . If your application requires the calibration to be made at different temperature values, you can specify this when you request the service. Typically, the calibration service is requested when

you order the sensor. If you would like the calibration service performed on a sensor you already own, you can return the sensor via a returned material authorization (RMA).

Learn More Here  
[campbellsci.com/tempcal2](http://campbellsci.com/tempcal2)



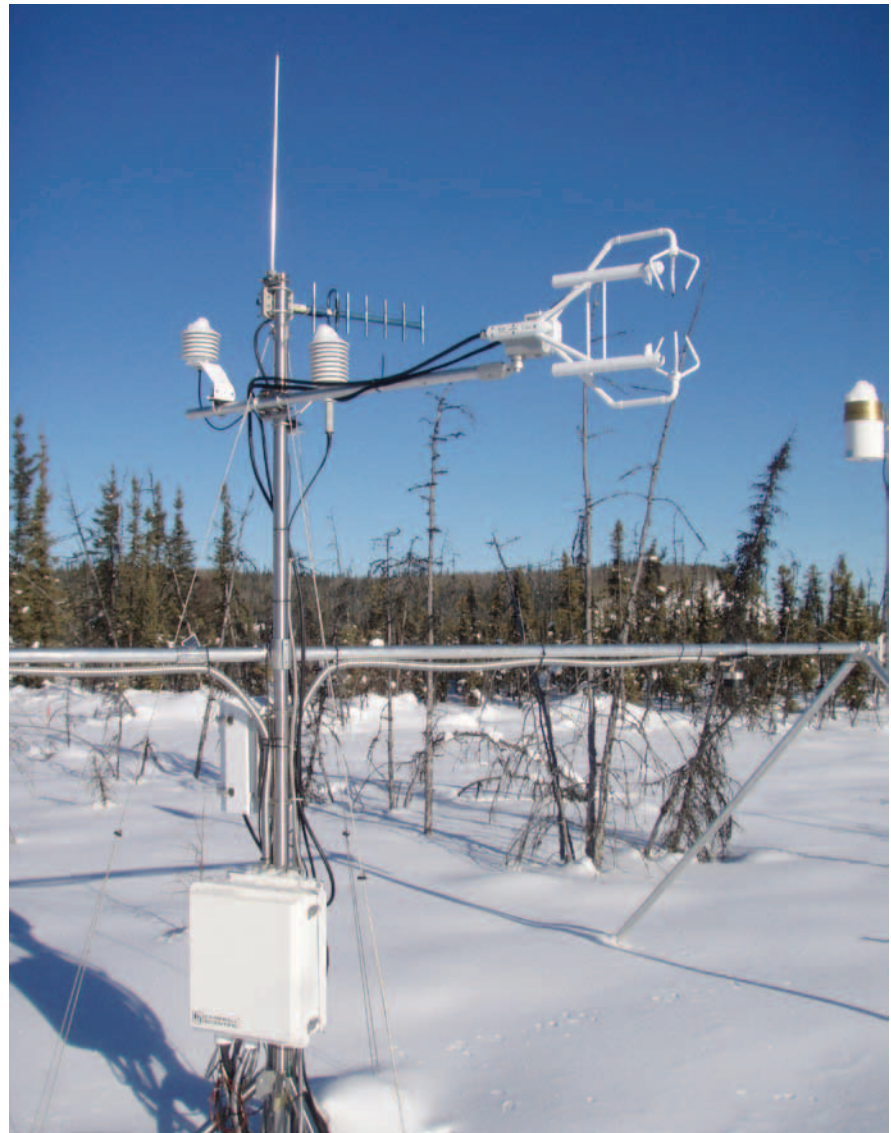
# Case Study: Alaska Eddy-Covariance Project



Scientists and land-use managers have long recognized the importance of forest lands for their role in carbon uptake. Predominantly, research and international policy focus has been on tropical forests and habitats because of their rapid growth characteristics, which also make them susceptible to frequent harvesting. More recently, however, habitats that are able to stably take up and store carbon are being recognized as an important piece of the global carbon picture. There has also been greater research focus on cool-climate landscapes, such as those in boreal regions. With mature forests and temperature limiting the rate of decomposition in these regions, the potential impact of climate change in altering these landscapes has brought an increased effort to more fully understand them.

Researchers from the University of Alaska Fairbanks, with funding support from the US Geological Survey, have instrumented three environmental monitoring sites within the Bonanza Creek Experimental Forest (part of the National Science Foundation's Long-Term Ecological Research Network). The sites are situated across a chronosequence of permafrost degradation that is representative of key habitats of the terrestrial boreal landscape—habitats that are driven by differences in microclimate. The three sites include a black-spruce stand (which represents an area of stable permafrost with intact black-spruce forest), an active thermokarst site characterized by melting ground ice with underlying permafrost and considerable tree mortality, and a stable, treeless fen site with a deep active-layer depth.

The project goal is to collect continuous year-round measurements of carbon, water, and energy fluxes, as they are the key linkages and feedbacks between the land



surface, the atmosphere, and the oceans of the boreal climate system. To date, relatively few such studies have been undertaken in the arctic due to the harsh environmental conditions and difficult access to remote locations. Continuous monitoring at locations with limited solar power availability in winter, where wind power is not a viable option, requires selecting robust sensors with extremely low power requirements, and remote system-diagnostic capabilities.

For the Bonanza Creek sites, Campbell Scientific's EC150 open-path CO<sub>2</sub>/H<sub>2</sub>O analyzer with CSAT3A sonic anemometer and CR3000 datalogger was chosen for eddy-covariance flux measurements because of specific design elements that address many

of these concerns. The very low power consumption of the EC150 proved especially beneficial over the winter months when solar power was limited. For these types of northern applications, periodic generator charges are often required during the darkest winter months. The EC150-based systems required only one generator charge throughout the winter, whereas the third site, which had a different CO<sub>2</sub>/H<sub>2</sub>O infrared gas analyzer, required three generator charges.

Another advantage of using the EC150 on this project is the system's self-regulating temperature control, which protects the

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# Case Study: Flood Warning in Arkansas

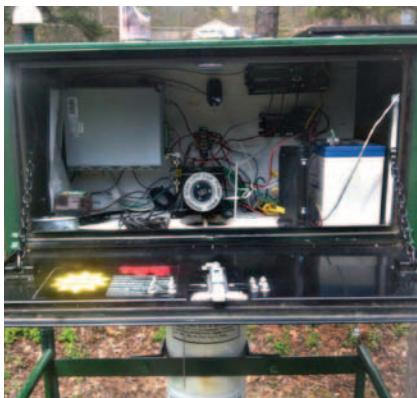


Hot Springs, Arkansas, is a history-rich city located adjacent to Hot Springs National Park. The city is blessed with mountainous terrain, recreational waterways, and more than 45 hot springs. Hot Springs Creek delivers spring water through the center of town. In 1884 the creek was enclosed, and the arch over the creek now serves as the base for Central Avenue. The surrounding mountains are of steep relief and expose large areas of nonporous bedrock. This combination of hydrology, topology, and geology make city infrastructure, especially Central Avenue, highly susceptible to flooding during microburst rainfall events.

Since 2008, the city of Hot Springs has worked cooperatively with the USGS Arkansas Water Science Center to maintain and operate their flood-warning information system. The system serves to provide timely flood information to city officials, first responders, and the regional National Weather Service offices. With proper warning, swift-water rescue teams can be readied, roads prone to flooding can be barricaded, and low-lying public areas can be evacuated.

The Arkansas Water Science Center has a yearly agreement with the city of Hot Springs to maintain the system. The USGS maintains all equipment, exercises functionality, and performs the needed discharge measurements to maintain flow models and stage-discharge relationships.

In 2013, the flood-warning information system was updated. Campbell Scientific hardware and software were chosen for their reliability and capability. In all, six gaging stations and the base station were overhauled.



Four of the stations report stream stage and rainfall. Each station contains a CR1000 datalogger, NL120 Ethernet interface, COM320 voice-synthesizing telephone modem, and GOES satellite transmitter. Measurements are reported via the Internet and the GOES system. Alarms are delivered directly from the station via text and interactive phone messaging.

Two of the stations report rainfall only. Each of these stations contains a CR1000 and a cellular data modem. Measurements are reported via the Internet, and alarms can be delivered directly by email or text message if needed.

At four stations, the CR1000 acts as an SDI-12 recorder and an SDI-12 sensor. As an SDI-12 sensor, the CR1000 shares measured data with a SatLink-V2 GOES DCP. GOES serves as a redundant telemetry path, feeding 15 minute observations to the USGS National Water Information System every hour.

The base consists of a computer with Campbell Scientific's LoggerNet, RTMC Pro, and CSI Web Server software installed. Additionally, at the base is a CR1000 with an NL120 and a COM320. The software is used for data collection and display, includ-

ing a web page for viewing real-time data by emergency personnel. The RTMC web page is configured to display gage rain and stage values, stormwater system level, and 48 hours of time-series gage observations.

The base datalogger provides redundancy, collecting data over the Internet independent of the base computer. The base datalogger issues alarms via text message and interactive phone messaging when user-defined thresholds have been met for gage height or hourly rainfall. Sending these alarms to key personnel is the most important function of the system.

The Arkansas Water Science Center, with Campbell Scientific training and technical support, has successfully implemented the needed improvements to the City of Hot Springs flood-warning information system. The system has already proven its improved reliability and flexibility under actual storm conditions.



# NL201 Replaces the NL200



New Product

Campbell Scientific's new NL201 Network Link Interface provides a wired Ethernet network connection for dataloggers and peripherals. Improvements over its predecessor, the NL200, include the addition of a ground lug and internal Ethernet surge protection, as well as the ability to be powered by the datalogger's CS I/O port.

The NL201 allows our dataloggers and other serial devices to communicate over a local-area network or a dedicated Internet connection. This interface supports sophisticated networking capabilities for PakBus devices and networks. Using a unique technique to bridge the Ethernet and CS I/O ports, the NL201 can provide direct access to the integrated IP functionality of our CR800, CR850, CR1000, or CR3000 dataloggers. The NL201 can also

act as a standard TCP serial server, serial client, Modbus TCP/IP gateway, and TLS proxy server for HTTPS and user-defined-port communication.

By providing both simple Ethernet communications and complex networking capabilities, the NL201 is a powerful device that can meet your networking needs in a wide range of applications.



Learn More Here

[campbellsci.com/nl201](http://campbellsci.com/nl201)



# New Heat-Stress Sensor



New Product



Campbell Scientific now offers the BlackGlobe, a sensor used to assess heat stress experienced by people. Heat stress is a serious situation that can result in fatigue, exhaustion, diminished physical and mental efficiency, and possibly even

disability or death. Those who are at risk for heat stress include athletes, soldiers, firefighters, farmers, construction workers, and others who work outdoors in hot environments.

The BlackGlobe measures radiant temperature with a thermistor inside a 15.2 cm (6 in) hollow copper sphere that is painted black. This measurement, along with the measurement of ambient air and wet-bulb temperatures, is used to calculate the wet-bulb globe temperature (WBGT) index, which

is an accepted standard for evaluating environmental heat stress. When the WBGT index indicates an increased risk of heat stress, appropriate actions can be taken to prevent detrimental health issues.

Learn More Here

[campbellsci.com/blackglobe](http://campbellsci.com/blackglobe)



# Registered for a Customer Account?



Company News

If you haven't taken the opportunity to register for our online Customer Center, we encourage you to do so.

The Customer Center provides services that you may find useful, including access to pricing, notifications of datalogger OS and software updates, newsletter subscriptions,

address-change forms, access to our user forum, and more.

Other resources will be added in the future. Customer Center accounts are available to current customers. If you would like to register for an account, visit our registration page at: [www.campbellsci.com/register](http://www.campbellsci.com/register).



UPDATE

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# Case Study: Alaska Eddy-Covariance Project

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inner parts of the analyzer in extreme cold while maximizing power-use efficiency. The EC150 also provides field-based CO<sub>2</sub> zero/span capability using only the datalogger, which allows uninterrupted monitoring, even in this very remote Alaska location.

Data collected from the Bonanza Creek sites includes fluxes of atmospheric carbon dioxide, water vapor, surface energy, photosynthetically active radiation, air and soil temperatures, rainfall, snow depth,

soil moisture content, wind direction and speed, and average atmospheric concentrations of CO<sub>2</sub> and H<sub>2</sub>O throughout the year. These data sets will help improve models of present carbon fluxes and guide predictions of how these processes are changing as the regional and global climates shift.

Learn More Here

[campbellsci.com/ak-ec](http://campbellsci.com/ak-ec)



## CR5000 Retired

 Company News

In January of 2000, Campbell Scientific introduced the CR5000 Measurement and Control Datalogger. Its ruggedness and high performance made it an important product solution for the test and measurement industry, and in a variety of higher-speed data-acquisition applications.



Unfortunately, because of component obsolescence we are no longer able to manufacture this datalogger. While there is no direct replacement for the CR5000, the CR3000 or the higher-speed CR9000X can be used for most applications. In the coming year we will be introducing new measurement products that will provide additional alternatives. With all of these choices, we expect to match or exceed all of the functionality of the CR5000.

Of course, we will continue our customer support and repair services for the CR5000, as we do for all of our retired dataloggers. Please contact a Campbell Scientific application engineer for help selecting the best datalogger for your application.

Learn More Here

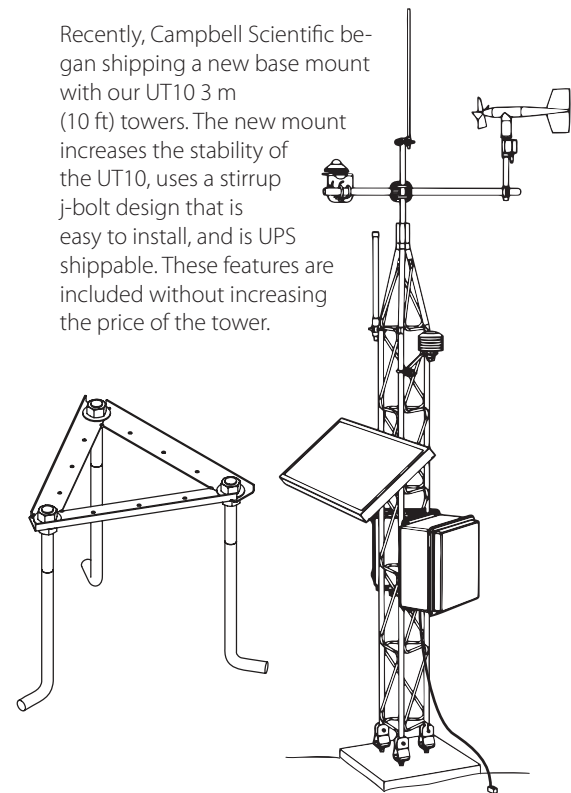
[campbellsci.com/cr5000](http://campbellsci.com/cr5000)



## Improved Base Mount for the UT10 Tower

 Product Update

Recently, Campbell Scientific began shipping a new base mount with our UT10 3 m (10 ft) towers. The new mount increases the stability of the UT10, uses a stirrup j-bolt design that is easy to install, and is UPS shippable. These features are included without increasing the price of the tower.



Learn More Here

[campbellsci.com/ut10](http://campbellsci.com/ut10)



# Tips and Tricks: What's in your toolbox?



One of the things I love about my job is the chance to get into the field. When I was just pocket-sized our group motto was "Be prepared...for (almost) anything."

I always carry these things in my toolbox:

Voltmeter

Screwdrivers

- Flat-blade (pn 1113)
- Phillips-head (pn 6290)
- Small flat-blade (pn 8125)

Wire cutter/stripper

Crescent wrench

Pliers

Pad and pen

Campbell support phone number

Laptop, fully charged, with software and drivers installed

Resource DVD

For some sites I also carry:

CR1000KD

Formatted CompactFlash cards

SC115 CS I/O-to-USB drive

SC12 two-peripheral connector cable

SC32B optically isolated RS-232 interface

What's in your toolbox? Let me know at [info@campbellsci.com](mailto:info@campbellsci.com). Put "Tip's toolbox" in the subject line.

Semper paratus,

*Tip*



## Upcoming Trade Shows

*Visit our website for training class schedules and additional listings.*

### NOVEMBER

02-06 ASA Annual Meeting

02-07 CERF 2013

22-24 Irrigation Association

Tampa, FL

San Diego, CA

Austin, TX

### JANUARY

28-30 DISTRIBUTECH

San Antonio, TX

### FEBRUARY

02-06 AMS 94th Annual Meeting

05-06 Golf Show

Atlanta, GA

Orlando, FL

### DECEMBER

03-06 NGWA Expo

10-13 AGU

Nashville, TN

San Francisco, CA



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