CAMPBELL SCIENTIFIC, INC.

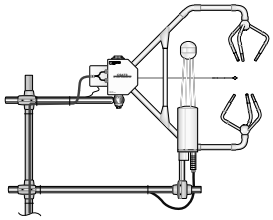
MEASUREMENT & CONTROL SYSTEMS

Micrometeorology

www.campbellsci.com/micrometeorology

Benefits of Our Systems

1. Eddy covariance systems can be based on a stand-alone datalogger, or datalogger and PC, to compute fluxes on-line and archive raw measurements for post-field analysis.
2. Measurement compatibility with most sensors; capacity to add sensors and configure systems to meet specific applications.
3. Remote data retrieval and system verification using a variety of telecommunication options.
4. Reliable operation over the environmental temperature range.
5. Long-term operation using batteries and solar panels.



CSAT3 and CS7500

CR23X

CR5000

Field intercomparison of fast response sensors measuring surface fluxes of heat, water vapor, and CO_2 (Cache Valley, UT).

Campbell Scientific offers research-grade instrumentation for micrometeorological applications including measurement of sensible heat, water vapor and trace gas fluxes, and atmospheric variables required by air quality dispersion models. We also offer a variety of automated weather station configurations.

Surface Flux Measurements

Our flux systems can measure atmospheric gradients or vertical turbulent transport directly. Standard systems that support either aerodynamic or Bowen ratio gradient techniques are available for measuring heat, water vapor, and CO_2 fluxes. Our standard eddy covariance systems use a three-dimensional anemometer and either an open-path krypton hygrometer or LI-COR's open-path H_2O and CO_2 analyzer. Measurements of other trace gas fluxes, such as N_2O and CH_4, are obtained with our TGA100A tunable diode laser analyzer.

Trace Gas Measurements

Using tunable diode laser absorption spectroscopy, the TGA100A Trace Gas Analyzer has the sensitivity to measure ambient gradients of trace gas species such as N_2O, NO_2, NH_3, CH_4, and CO_2, and a frequency response sufficient for eddy covariance applications. The TGA100A is a rugged, portable instrument designed for field use. The TGA100A supports valve switching for profile or gradient measurements from multiple sites. When used in eddy covariance applications, a CR5000 or CR1000 datalogger collects TGA100A data via an SDM interface, or the TGA100A can provide an analog concentration signal to an independent DAS.

Sampling Systems for Concentration Profiles

Campbell Scientific designs and manufactures sophisticated sampling systems for measuring trace gas profiles from multiple sites with a single analyzer. Simultaneous measurements of multiple gas species are possible using multiple analyzers. Operating techniques and the use of low volume manifolds minimize the equilibration time after intake switching. The system response, even for low flows, permits measurement of eight-levels in one minute, eliminating the need for averaging volumes. Elimination of condensation in unheated sample lines provides an additional benefit.

Eddy covariance experiments over marsh grass (Cache Valley, UT).

Weather and Air Quality Measurements

Our automated weather stations, known for their reliability and on-site processing, are used world-wide to record air temperature, relative humidity, wind speed and direction, precipitation, atmospheric pressure, solar radiation, and other variables. Air quality stations configured with 10 m towers provide measurements that meet the U.S. Environmental Protection Agency's guidelines for use in dispersion modeling. Means and standard deviations of wind speed and direction are processed by the datalogger, and temperature gradients used in determining atmospheric stability classes are provided. Further information on these applications is provided at our Weather and Climate, and Air Quality InfoCenters at www.campbellsci.com.

Bowen ratio systems measure temperature, water vapor, and carbon dioxide gradients over sorghum (Lincoln, NE).

Dataloggers

Our dataloggers, world-renowned for their reliability, integrate the measurement, processing, data storage, and control functions required by micrometeorological field systems. Measurement types, scan rates, and recording intervals are programmable. External devices such as valves and samplers are controlled based on time or measured values, and a powerful set of on-board instructions and algorithms process measurements on-line. All of this is provided by a low-powered, rugged set of electronics operable over the full environmental temperature range.

Data Retrieval

In addition to on-site data storage, multiple telemetry options provide remote data collection and system verification. Landline and cell phone, RF, phone-to-RF, and Internet communications are supported by our PC software. Extended line-of-sight RF, GOES, and other satellite options are supported by our datalogger software.

A trace gas analyzer uses TDLAS technology to measure N_2O or CH_4 fluxes during BOREAS (Prince Albert, SK, Canada).

(435) 753-2342 (435) 750-9540 fax info@campbellsci.com www.campbellsci.com
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