



Photo Credit: Gayle Dana, DRI

Eddy correlation station provides data for energy balance studies. (Canada Glacier, Taylor Valley, Antarctica).

## CSI gear at the core of weather network in the McMurdo Dry Valleys, Antarctica

# Monitoring one of Earth's most extreme deserts

The Long-Term Ecological Research (LTER) program, sponsored by the National Science Foundation, monitors ecological phenomena in a range of environments. The program supports 16 sites in North America and two in Antarc-

tica, including the newest site in the McMurdo Dry Valleys—one of the most extreme deserts on Earth. The McMurdo LTER, headed by Dr. Robert Wharton, Jr. (DRI), is the coldest and driest site.

The study attempts to understand two processes: the influence of physical and biological constraints on dry valley ecosystems, and the effects of material transport on these ecosystems.

All ecosystems are shaped by climate and material transport, but nowhere is this more apparent than in the dry valleys. During a few summer weeks, temperatures breach the freezing mark and glacial melt feeds ephemeral streams and perennially ice-covered lakes. This period is essential to sustaining life because most material transport (organic carbon, nutrients, and sediments) occurs

### APPLICATION AT A GLANCE

**Application type:**  
Ecological research

**Project area:**  
McMurdo Dry Valleys, Antarctica

**Authors:**  
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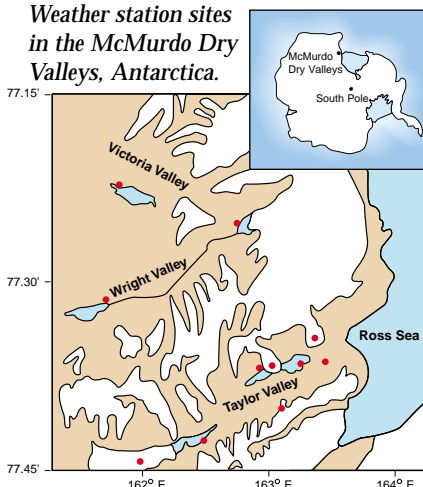
**Contracting agencies:**  
National Science Foundation

**Datalogger(s):**  
Campbell Scientific CR10s, 21Xs

**Communication links:**  
Storage modules, satellite

**Measured parameters:**  
Level, temperature, conductivity of iced lakes; soil temperature; discharge, conductivity, and temperature in streams; eddy correlation

### Weather station sites in the McMurdo Dry Valleys, Antarctica.



Continued on back



*Summer reaches the Antarctic, providing an opportunity to visit a "balmy lakefront" site.*

### Continued from front

during this time.

Biota that persist in this harsh environment are not evident to the casual observer. Microscopic plants and organisms find refuge in small melt pools on the glaciers (cryoconite holes), on beds of ephemeral streams, in ice-covered lakes, and in the soil.

One of the study's first steps was to establish a data acquisition network to document the complex interactions between the biological and physiochemical environments.

Harsh weather conditions in the dry valleys offer unique challenges for data collection. Equipment must survive

extreme temperatures and winds, a four-month absence of solar power, and extended periods without maintenance. Furthermore, the diverse weather conditions require a weather network, as opposed to a single station common at other LTER sites.

By the completion of our third field season (February 1996), we will be operating 11 Campbell Scientific meteorological stations that comprise the McMurdo LTER Automatic Weather Network (LAWN). Six of these stations are located on lake shores, and four are mounted on wooden stilts on local glaciers, including an eddy correlation station that aids in energy balance studies.

McMurdo LTER also operates CR10-based systems that continuously measure:

- level, temperature, and conductivity in three ice-covered lakes.
- discharge, conductivity, and temperature in 14 streams.
- soil temperature at various depths in a warming experiment.

In all, the McMurdo LTER operates more than 30 CR10s and two 21Xs.

In the future, the stations will transmit real-time data to McMurdo Station (~100 km east) for access via the Internet. This data will help us plan repairs and upgrades, and will be used to compare Radarsat (Canadian satellite recently launched) imagery with surface conditions.



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