NEWS

New User Facility for Environmental Sensing

PAGE 483

Hydrologic instrumentation is undergoing a transformative shift in its ability to concurrently measure scales from centimeters to kilometers [e.g., *Selker et al.,* 2006]. To rapidly distribute and incorporate these advances in the Earth and hydrologic sciences, the U.S. National Science Foundation's Earth Sciences Instrumentation and Facilities Program launched in September 2009 a community-accessible instrument facility for distributed temperature sensing (DTS) and wireless networked environmental sensing.

DTS systems for the facility use laser-induced Raman backscatter (spectrally shifted scattered light whose intensity can be related to the thermal state of the optical fiber) to measure the distribution of temperatures along fiber-optic cables up to 30 kilometers long. The DTS systems can measure temperatures along fiber-optic cable with spatial resolution of less than 1 meter and with temperature resolution of ±0.01ºC. In contrast to "single point in space" measurements of environmental temperatures or "single point in time" remote sensing of temperatures, DTS provides the opportunity to continuously monitor temperatures of air, water, soil, or snow at high spatial and temporal frequency without the need for a large network of measurement systems. The DTS techniques, first widely deployed in the past decade by the oil and electric power industries, have been applied to a wide variety of near-surface Earth observations, including stream and groundwater interaction, snowpack evolution and melting, mixing and energy budgets of lakes and streams, soil moisture sensing, atmospheric processes, and dam seepage.

The Center for Transformative Environmental Monitoring Programs (CTEMPs), jointly operated by Oregon State University and the University of Nevada, Reno, provides short- and intermediate-term project access to five field-deployable DTS systems that can be shipped directly to project sites. CTEMPs is operating as an instrumentation node of the Hydrologic Measurement Facility of the Consortium of Universities for the Advancement of Hydrologic Science, Inc. These DTS systems are available to the Earth science community and can be configured for a wide variety of environmental measurements, data storage/data transmission protocols, and operating conditions. CTEMPs also will provide—as part of the field-deployable systems—wireless autonomous meteorological stations to augment the thermal data collection, as well as advice, guidance, and logistical services to the user community. CTEMPs users will have access to instrumentation as well as technical support for experiment design, field deployment, and data interpretation.

CTEMPs, working with industry, also will make extended-resolution (spatial and temporal) DTS systems available to address the most demanding applications of this technology. CTEMPs anticipates that in early 2010 it will make available to the research community a DTS with 0.25-meter spatial-scale and 1-second temporal-scale capability, which will be 4 times better spatial resolution and 10 times better temporal resolution than currently available instruments. Additionally, CTEMPs is testing a suite of other sensing systems, including fiber-optic distributed strain and acoustic sensing, and a spectrum of low-cost and high-precision point sensors suitable for traditional and wireless networked sensing systems.

CTEMPs also is offering a series of 1-day introductory short courses and 4-day hands-on workshops to train researchers and students on the leading edge of distributed sensing.

For more information about the center and its short courses, and to apply to use the field-deployable DTS systems, visit http://www.ctemps.org or contact Susan Atkisson at susan.atkisson@oregonstate.edu.

Reference

Selker, J. S., L. Thévenaz, H. Huwald, A. Mallet, W. Luxemburg, N. van de Giesen, M. Stejskal, J. Zeman, M. Westhoff, and M. B. Parlange (2006), Distributed fiber-optic temperature sensing for hydrologic systems, *Water Resour. Res., 42,* W12202, doi:10.1029/2006WR005326.

—SCOTT TYLER, University of Nevada, Reno; E-mail: styler@unr.edu; and JOHN SELKER, Oregon State University, Corvallis

FORUM

A New Approach to Data Publication in Ocean Sciences

PAGE 484

Data are collected from ocean sciences activities that range from a single investigator working in a laboratory to large teams of scientists cooperating on big, multinational, global ocean research projects. What these activities have in common is that all result in data, some of which are used as the basis for publications in peer-reviewed journals.

However, two major problems regarding data remain. First, many data valuable for understanding ocean physics, chemistry, geology, biology, and how the oceans operate in the Earth system are never archived or made accessible to other scientists. Data underlying traditional journal articles are often difficult to obtain. Second, when scientists do contribute data to databases, their data become freely available, with little acknowledgment and no contribution to their career advancement. To address these problems, stronger ties must be made between data repositories and academic journals, and a "digital backbone" needs to be created for data related to journal publications.

Links Between Data Repositories and Academic Journals

The Scientific Committee on Oceanic Research (SCOR) and the International Oceanographic Data and Information Exchange (IODE) of the United Nations Educational, Scientific and Cultural Organization's Intergovernmental Oceanographic Commission (IOC) are discussing how to provide better access to ocean data through increased submission to approved, open, online resources. Such new infrastructure and new approaches to data publication could help scientists who observe the ocean and model its processes. Most important, it is now timely to

- increase the availability of data used to create figures, tables, and statistical analyses in traditional journal articles;
- reinforce linkages between data lodged in data centers and science publications, particularly "data briefs"; and
- encourage the publishing of journals that specialize in "data publications" or "data briefs."

Data publications are short descriptions (as short as a few paragraphs of text), not interpretations, of data sets. They provide persistent pointers to the data in an approved data repository as well as references citable in papers that use the data, and in authors' curricula vitae.