

# CUAHSI/USGS/UVM

## Hands-on Workshop:

## In situ Optical Sensors for Water Quality

August 2-5, 2009

RUBENSTEIN ECOSYSTEM SCIENCE LABORATORY  
UNIVERSITY OF VERMONT, BURLINGTON, VERMONT

*In situ* optical sensors are rapidly developing and emerging technologies that hold enormous promise for measurement of important biogeochemical parameters at very high temporal resolution (down to seconds) and potentially over large spatial scales. Broader use of these new instruments in watershed research is critical to advance our understanding of biogeochemical cycles. However, the productive application of sensors that were originally developed for oceanographic studies to rivers and streams remains a critical challenge. For example, how do you design deployment strategies for focused studies versus long-term monitoring studies? What are the maintenance and data processing requirements for each sensor or suites of sensors? Which sensors are the most reliable and robust to deploy in lakes and rivers? How do you evaluate and ensure data quality from sensors?



This 3-day training workshop will focus on how to successfully deploy, maintain and process data from *in situ* optical sensors in freshwater systems. The workshop will focus on the use of *in situ* fluorometers and spectrophotometers for studies of organic matter, nitrate and particulates in rivers, streams and lakes. The workshop will be led by the USGS Bay-Delta Carbon Group (California Water Science Center), which is one of the few groups conducting research with *in situ* optical sensors in freshwater systems. The USGS group currently owns and operates instrumentation used for direct measurements and proxies for depth profiles in reservoirs, diurnal studies in rivers and shallow wetlands, storm event sampling, long-term river deployments, and tidal wetland fluxes. This workshop should be of interest to graduate students, post-doctoral fellows, and research scientists working on watershed management, drinking water quality, ecosystem dynamics, and climate change.

**Instructors:** USGS Bay-Delta Carbon Group (Brian Pellerin, Brian Bergamaschi, Bryan Downing, JohnFranco Saraceno)

**Coordinators:** Breck Bowden, UVM, ([breck.bowden@uvm.edu](mailto:breck.bowden@uvm.edu)), Brian Pellerin, USGS, ([bpeller@usgs.gov](mailto:bpeller@usgs.gov)), Joe Bartlett, UVM, ([joseph.bartlett@uvm.edu](mailto:joseph.bartlett@uvm.edu))

**Sponsors:** The Consortium of Universities for the Advancement of Hydrologic Sciences (CUAHSI) Hydrologic Measurement Facility (HMF); The National Science Foundation; University of Vermont Rubenstein Ecosystem Science Lab (RESL); Vermont Water Resources and Lake Studies Center; US Geological Survey

**Participation:** Limited to 30 participants (on a first come basis).

**Registration:** To register your interest in participating in this workshop please click [here](#) and enter the requested information. The workshop fee must be paid in full no later than 30 June 2009 to assure participation. (Direct link: <http://www.cuahsi.org/hmf/sensor/index.html>).

**Cost:** Expected cost will be at most \$500 per person for the workshop (based on total enrollment). Includes the workshop, 3 nights lodging at University of Vermont, materials, breakfast and lunch.

**What to Bring:** Boots, field clothing (rain or shine), laptop computers. If you wish, bring your own sampling supplies or favorite sensors to simultaneously collect additional data that could be useful and instructive for the workshop.

**Getting to Burlington:** The Burlington area is served by a local airport (BTV) with multiple air carriers, as well as bus, train, and interstates from Boston, New York, and Montreal. Airport pickup/dropoff can be provided on August 2 and 5 if needed.

### **Workshop Program:**

#### **Sunday, August 2, 2009 – Welcome and Registration**

**17:00-20:00** *Welcome mixer / registration*

#### **Monday, August 3, 2009 – Principles, Tools and Applications**

**7:30-8:30** *Breakfast, continued registration*

**8:30-9:00** Participant Introductions

**9:00-9:15** Introduction to the Workshop (Bowden, Pellerin)

**9:15-9:45** Introduction to optical measurements I: Principles (Bergamaschi)

**9:45-10:30** Introduction to optical measurements II: Current technology (Downing)

**10:30-12:00** Deployment strategies (Downing)

**12:00-13:00** *Lunch*

**13:00-14:00** Applications to freshwater systems I: Lakes (Bergamaschi)

**14:00-15:00** Applications to freshwater systems II: Rivers (Pellerin)

**15:00-15:30** *Break*

**15:30-18:00** Hands-on package prep for lake profiling (Downing)

**19:00** Dinner - Pay as you go group dinner at a restaurant in Burlington

#### **Tuesday, August 4, 2009 – Field deployments: lake profiling and/or river deployment**

**7:30-8:00** *Breakfast*

**8:00-8:30** Introduction to field deployments (Pellerin)

**8:30-12:30** Lake profiling (Team A w/ Downing, Bergamaschi), stream deployment (Team B w/ Saraceno, Pellerin)

**12:30-13:30** *Lunch*

**13:30-17:30** Lake profiling (Team B), stream deployment (Team A)

**17:30-19:00** *Break*

**19:00-20:00** Dinner - Pay as you go group dinner at a restaurant in Burlington

#### **Wednesday, August 5, 2009 – Data analysis, lessons learned and needs of the community**

**7:30-8:30** *Breakfast*

**8:30-9:30** Discussion of field experiences (Pellerin)

**9:30-11:30** Data analysis and interpretation (Downing)

**11:30-12:00** Data management / transfer (Saraceno)

**12:00-14:00** Working lunch discussion: future community needs for instruments (Pellerin)

**14:00-15:00** Wrap up (Bowden)