GLEON 14 New Sites/Site News

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10:30-11:10

List of Abstracts

Networking lake observatories in Europe (NETLAKE): a new EU COST Action

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Developments in sensor technology now allow high-resolution monitoring of lakes and reservoirs from in-situ platforms, with the data provided to local end-users by web-based technology. The information acquired by these systems is currently reviewed on a site-by-site basis, but an even greater potential lies in the integration of data from many sites into a European network. The EU COST Action NETLAKE (Networking lake observatories in Europe) will run for four years from October 2012 (www.cost.eu/domains_actions/essem/Actions/ES1201). The over-arching objective of NETLAKE is to establish a network of scientists, technologists, managers and stakeholders focused on the development and application of cutting-edge sensor technology for the protection of European lakes and reservoirs. The Action currently has participants from 20 COST countries and 3 non-COST countries (Australia, New Zealand and USA) and has strong links to GLEON. NETLAKE deliverables will include a meta-database of instrumented sites, case studies on management-relevant topics, data analysis tools, and a citizen science programme to involve local communities in the protection of water resources. The key deliverable, however, will be the establishment of the NETLAKE network, bridging communication gaps between European researchers, policy makers and managers, and between scientists and local communities.

Update on a new GLEON site, Lake Lacawac, PA, US: Data and opportunities

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Lake Lacawac is a small (25 ha) seepage lake in northeastern Pennsylvania and recently became a new GLEON site. Limnological data have been collected from this lake since the 1960s with greater efforts beginning in 1988. High frequency weather and lake monitoring stations have also been maintained starting in the early 1990s. In June of 2012, a state-of-the-art profiling buoy was installed in Lake Lacawac. The buoy design was a joint collaboration between Miami University of Ohio, Fondriest Environmental, Inc., and Lehigh University. This presentation will cover a general description of the lake and the data we have available through our routine and high frequency sampling. Our presentation will also describe opportunities available at Lacawac Sanctuary including a description of our recent Lacawac Ecological Observatory Workshop (LEOW). In June 2012, we hosted LEOW which was designed to train students, faculty, and technicians to use advanced aquatic sensors, process sensor data, and analyze high-frequency data. Our presentation will discuss the outcomes and products of LEOW as well as future plans and opportunities to become involved in upcoming LEOW events.

Initial results from a new Arctic GLEON site in Barrow, Alaska

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The Arctic Coastal Plain (ACP) of northern Alaska is a lake-rich landscape. Despite the limited annual precipitation in this region, low evaporation rates and abundant permafrost result in significant ponding of water and the formation of numerous thermokarst lakes (or "thaw lakes"). Together with drained thaw lake basins, these surface water features occupy roughly 40% of the total land area on the ACP. A project known as the Circum-Arctic Lakes Observation Network (CALON) was initiated in 2012 to begin monitoring Arctic thaw lakes as part of the NSF Arctic Observing Network (AON). Over 50 lakes on the ACP are being monitored through the CALON project to establish a baseline for lake temperature, ice cover, hydrology, and biogeochemistry. A real-time data buoy was deployed on one of the primary study lakes in Barrow, Alaska in July of 2012 to make intensive measurements of the lake energy balance, meteorology, water temperature, and wave conditions. We present some of the preliminary results from this past summer, as well as measurements of snow, ice, and water temperature that were made during the spring thaw period using autonomous temperature and light sensors.

New Sites: Lake Winnebago Observational Buoys

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Lake Winnebago is located within the Lake Michigan watershed in Northeastern, WI. This is the largest lake in Wisconsin, and intercepts the Fox River, the largest source of water to Green Bay, Lake Michigan. It is shallow with an average depth of 4.4 m and maximum depth of 6.5 m. Lake Winnebago was named after the Winnebago Tribe of Native American Indians, and is vital to the economics of the region, providing recreational activities for residents and tourists (e.g., boating, swimming, water skiing). Angling in Wisconsin is a $2 – 3 billion/year industry, and Lake Winnebago supports one of the largest sturgeon fisheries in the United States. Furthermore, this lake serves as a drinking water resource to more than a quarter of a million people in four cities surrounding the lake. Unfortunately, this lake is also plagued by frequent toxic cyanobacterial blooms, and bottom water hypoxia making it an impaired waterway. In 2011 and 2012, a buoy was deployed by the USGS near the center of the lake, and in 2012, a similar buoy was deployed in the southern portion of the lake by UW- Milwaukee. Together these buoys provide measurements of typical limnological (e.g. water temperature, dissolved oxygen, chlorophyll, phycocyanin) and weather variables. Data are reported to land base stations in near- real time via cellular telemetry. The data are used to investigate nutrient loading, bottom water hypoxia, toxic cyanobacterial blooms and their impact upon drinking water quality, and aid in the development of a TMDL for Lake Winnebago.

Sensing the Americas' Freshwater Ecosystem Risk (SAFER) from Climate Change: An InterAmerican Socioecological GLEON Network Supported by IAI

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Climate variability imposes a range of regional changes on water fluxes and storages triggering changes in freshwater ecosystems and their services. The severity of the changes to is highly variable, but it many freshwater ecosystems will be at risk. Unfortunately, the connection between climate variation and these threats is poorly understood and difficult to assess because it depends on regional climate responses to global climate change. Furthermore, the value of ecosystems services also varies regionally, and assessing and mitigating these threats will require a multi-disciplinary approach in these tightly coupled natural-human systems. We hypothesize that, within freshwater systems and adjacent watersheds, predicted changes in the global and regional climate will produce an alteration of the hydrological cycle, which can be estimated from the freshwater discharge and waterborne deliverables. The effects of climate change will also interact with multiple human stressors. As a result of change in the ecosystem conditions, the ecosystem services provided by them will also change significantly. The objectives of this project are: 1) employ freshwater ecosystems as "sentinels" of climate variability and watershed processes and investigate their interaction with other stressors to assess risks to ecosystem services, and 2) determine management and mitigation strategies which are both technically and economically feasible as well as culturally acceptable. The research outcomes will be: 1) delineation of freshwater ecosystem service risks, 2) determination of management and mitigation strategies, and 3) training of the next generation of scientists in terms of international, interdisciplinary research with policy-relevant outcomes.

Planetary Lake Lander: Deglaciation and the Evolution of Planetary Lake Habitability

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The Planetary LakeLander project is studying the impact of rapid deglaciation at Laguna Negra, Chile (-33.647493,-70.126127) while simultaneously developing the adaptive systems capable of providing a remote lake observatory system the ability to autonomously observe, detect, and respond to unusual and extreme events such as major glacial discharges. The development of these technologies will inform the ability to study astro-limnological systems, such as the lakes detected on Titan, the largest moon of Saturn.

Laguna Negra is a high elevation alpine lake with glacial inputs. A buoy and related peripheral hardware were installed during summer 2011-2012. The system is currently being retooled and will be deployed continuously for the next several years beginning in summer 2012-2013. The system includes a YSI profiling winch with optical chlorophyll, phycocyanin, oxygen, and turbidity sensors as well as pH, temperature, and conductivity. A temperature string, camera system, and surface meteorology sensors will also be deployed. Adjacent to the lake are sensors measuring meteorology, stream flow, stream temperature, and solar radiation.

New Site: West Long Lake, Michigan, USA

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Long Lake is a small (8 ha, 14 m max. depth), hour-glass-shaped lake on the property of the University of Notre Dame Environmental Research Center (UNDERC). The small (~16 ha), forested catchment results in an oligo-mesotrophic lake (total phosphorus=12 mg P m^{-3}) with low to moderate DOC concentrations (7 g C m^{-3}). The lake has been studied for at least two decades. In the early 1990s the lake was split into three experimental basins to support early work on the trophic cascade. For the past 2 years, the lake has been separated into two experimental basins as part of ongoing research exploring the implications of terrestrial carbon for aquatic food webs. West Long Lake (4.9 ha, 14 m max. depth) was formed as a part of the current experimental division and serves as a control basin. In our five-minute presentation, we will briefly report on West Long Lake, our ongoing experiment, and an additional set of eleven lakes that were instrumented with sensor packages for varied amounts of time over the last year.

EXPERIMENTAL SET UP for the continuous MONITORING OF the internal HYDRODYNAMICS in A DEEP PREALPINE LAKE

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Lake Iseo is a deep prealpine lake that, with its $8 \cdot 10^6$ $m^3$of fresh water, constitutes a strategic resource for Italy. Historically classified as warm monomictic, in the last 2 decades only two complete overturns occurred, so that its deep-waters underwent a process of progressive deoxigention.

In spite of this critical environmental condition, only the chemical of Lake Iseo has been regularly monitored, whilst no measurements aimed to understand its hydrodynamics has ever been conducted before 2009. Hence, the hydraulics group of the University of Brescia set up a monitoring stations network that measures most of the thermal and mechanical forcings acting on the lake surface and at the main tributaries. The internal motions driven by these forcings have been monitored by measuring high resolution temperature data in different lake locations and depths, as well as by tracking water paths with lagrangian drogues. Data are provided in real-time by most of the stations, collected by a database and shown in a web-site in current development. Additionally, an intensive experimental campaign has been recently accomplished to map the spatial variability of temperature, conductivity, oxygen and turbidity over the whole lake.

Altogether, these data clarified some important aspects of the internal Iseo hydrodynamic that, during most of the stratified period, is characterized by the interflow as the prevailing river entrance mode and by an intense internal wave activity in the upper layers. Additionally, the spatial distribution of hypolimnetic oxygen shed light into the strong reduction of fish habitat occurred over the last decades.