24 April 2006

GLEON notes from 29-31 March 2006 meeting in Townsville, Queensland, Australia

Representatives from the following lake groups attended the meeting:

U Waikato, NZ: David Hamilton, Chris McBride
NIWA, NZ: Max Gibbs
Lammi Station, Finland: Marko Jarvinen
Nanjing Institute, China: Guang Gao, Guangwei Zhu, Yunlin Zhang
New Hampshire: Kathie Weathers
Lake Kinneret, Israel: Ami Nishri, Yigal Salingar
Lake Biwa Research Institute, Japan: Michio Kumagai
CWR, Australia: Chris Dallimore
U Adelaide, Australia: Justin Brooks
CSIRO Australia: Brad Sherman
Academia Sinica Taiwan: Charles Chiu,
NCHC Taiwan: Hsiu-Mei Chou, Fang-Pang Lin
NTL, Wisconsin: Tim Kratz, Paul Hanson, Barbara Benson, Dave Balsiger

IT experts and others not affiliated with specific lake groups included:
Peter Arzberger, UCSD: Tony Fountain, SDSC; Longjiang Ding, SDSC, Karan Bhatia, SDSC; Cindy Zheng, SDSC; Ken Chiu, SUNY-Binghamton; Rick McMullen, Indiana U.; Kum Won Cho, KISTI; Radha Nandkumar, NCSA, others???

The GLEON sub-group discussed three main topics during its breakout session:

A. Science: short and medium term science goals
B. Logistics: what is the status of individual sites and what can be done to bring more sites online
C. Information Technology: what are the IT need of the sites and the network and how can we best move forward to meet these needs.

A. Science
    a. We identified three topics for an analysis and paper that could be done within the next 12 months
        i. "Taxonomy of diel O2 dynamics in lakes.": This paper would examine the patterns of diel O2 dynamics measured using high frequency data (i.e. measurements every 5 or 10 minutes) in lakes across the GLEON network. The idea is that we will see a mixture of biologically driven patterns (e.g. a sinusoidal pattern of increasing oxygen during the day and decreasing at night; or leveling off during the day due to photoinhibition) and physically driven patterns (e.g. midnight sub-peaks in oxygen caused perhaps by horizontal or vertical mixing from convective cooling or other processes). We think there will be O2 data from about 18 lakes by the end of summer

2006. Ancillary data would include: surface DO at 5 min intervals; water temperature; wind speed; air humidity; irradiance; air temperature; precipitation; BP; wind direction;

ii. "Chlorophyll dynamics": a somewhat similar analysis, but for chlorophyll fluorescence instead of oxygen. More focused on understanding patterns of waxes and wanes of algal blooms. Data from fewer lakes are available

iii. Usefulness of high-frequency data for limnological analyses. Compare "continuous" data from sensors with weekly, biweekly or monthly data collected manually to examine whether the monthly sampling regime addresses the inherent natural variability in physical or biological measurements; we might expect to see increasing variability of biological compared with physical measurements. There was discussion as to whether this should be a stand alone paper or folded into the above efforts.

iv. Timeline: Data from roughly 16 plus lakes by August. This would allow time to have the meeting in October to address data analysis.

v. NOTE: This is a qualitative study rather than an examination of underlying processes. Subsequent studies would look at mechanisms underlying the qualitative result.

vi. NOTE: In addition, this activity will inform the IT group, and subsequent studies we hope would be conducted with an IT infrastructure – and the qualitative part would be automated (integration of data).

b. Discussion about Research Coordination Network resubmission to NSF in June—some potential topics. Paul Hanson to take lead on proposal

i. Comparison over gradients of climate/latitude

ii. Role of events – floods, typhoons etc.

iii. Physical-biological coupling across a series of time scales

iv. How control (drivers vs. response) changes over scale

v. Environmental forcing at different time/geographic scales; Will lakes respond differently, given their different characteristics and geographies

vi. Local, regional coherence: At what geographic/time scales are lakes coherent? Marko's nitrate example.

vii. Science not dependent on the sensor networks.

viii. Coupling variables (sensors) with traditional samples (e.g. chemistry).

ix. Provision of data for models at scales necessary for those models.

x. Linking with remote sensing tools.

c. Modeling. There was extensive discussion among David Hamilton, Chris McBride, Ken Chiu, and Paul Hanson about running a comparison of the physical models, i.e., 1d vs. 3d vs. 3d non-hydrostatic. We have most of the necessary data and preliminary work could this summer. One IT issue is whether to conform to developing model standards for data structure (in the export of data from the db that is then used as input for the models), or to simply export data from the dbs to a matrix and let the modelers deal with model-specific requirements. See IT section below.

B. Logistics:

a. Discussion of site status – see table below

b. Next meetings
    i. Large Lakes meeting Lake Biwa, Japan 29 – 31 October 2006 (see web site)
    ii. Taiwan in first week of October 2006
    iii. Finland (Lammi Biological Station) March/April 2007
    iv. SIL meeting in Montreal in August 2007: Kratz to submit proposal for special session on GLEON/high frequency data in limnology

Site	**status**	**online**
NZ	deploying	June
Finland	waiting for ice-out	July?
China	planning, but O2 this summer	???
New Hampshire	planning	August?
Israel	working	waiting for data registration portal
Japan	working	???
Australia CWR	working	data not publicly available
Australia Justin	O2 data available	
Australia CSIRO	not deployed,O2 data available	
Taiwan	working +/-	now
Wisconsin	working +/-	now

C. Information Technology Issues
    a. Conceptually, we saw demonstrations on the three areas of the end-to-end system: Data acquisition and instrument management, Data integration including query; Data analysis and modeling
    b. Focus was primarily on data integration. (the following text came from pre-proposal based on discussion at GLEON/CREON 2. Authored by Tony Fountain: To create a functioning network that at a minimum has the ability to share data, we will focus on core data integration, sharing services. This entails agreeing on the representation of the data, including schemas (SQL-based or otherwise). The evaluation will be objective, thorough, but not excessive. For example, on approving a database solution it should best tested along the lines of the following:
        1. from science team identify variables and metadata [recall – the science team has identified two to four key questions of interest – that will drive the sensors that are deployed]
        2. from science team identify queries
        3. gather/generate representative data
        4. test competing data solutions and benchmark performance (adequacy, efficiency)

The final acceptance (and guarantees) should be based on the performance on the test data set and the suite of queries.

NOTE: Conceptually, this group would take advantage of the Science Groups data, using those science drivers to construct an infrastructure, starting with the questions above.
NOTE: A rough time frame was to have this step completed by the time of the next meeting, October 2006. One goal was to create a working set of recommendations regarding standardization issues.

Tony Fountain, Barbara Benson, and Rick McMullen agreed to create a survey of participating groups to gather information relevant to data integration, e.g., format of data, database schemas, IM staffing.

c. Modeling: There was a great deal of interest in a subgroup on modeling. David Hamilton will begin coordinating a group to articulate model input data requirements at the next meeting and to have inputs from modelers on the different modelling tools that are available.
d. Cross-Group IT group. There was an agreement by a group of individuals to meet on a regular basis of to ensure cross-group (e.g.lake, coral reef) technology transfer. Members of the group are listed below. Components of infrastructure of interest to both groups related to data acquisition, data integration across the Network, and data analysis. A shared knowledge base of best practices, lessons learned and site implementation would be useful. The group expressed an interest in generating a mechanism to exchange design documents, for designs both at the site and Network levels. A web page could be a simple way to implement this sharing.

Appendix: List of Joint IT group

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