



GLEON

Networked lake science

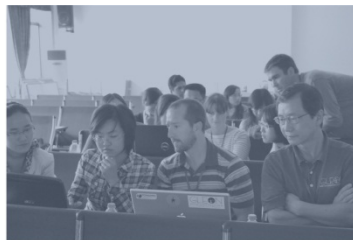
Global Lake Ecological Observatory Network

Citizen-based Monitoring Coordination Successes and Challenges: Lessons from GLEON

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Estonia
Finland
Germany
Hungary
India
Ireland
Israel
Italy
Kenya
Netherlands
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Nigeria
Pakistan
Poland
Puerto Rico
Russia
South Korea
Spain
Sweden
Switzerland
Taiwan
Turkey
United Kingdom
United States





GLEON

Networked lake science

Global Lake Ecological Observatory Network

... a network people, lakes and data

Publications

2011

Fragoso, C. R., Motta I.
Software, 26, 1337-13

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Hanson, P. C., Hamilto
doi:10.1371/journal.po

Niu, F., Ré, C., Doan, A

Pierson, D. C., Weyher
phenology. *Limnol. Oc*

Read, J. S., Hamilton,
Modelling & Software,

Read
doi:10

Sadr

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-9741

(2011). Potential effects of climate change and eu

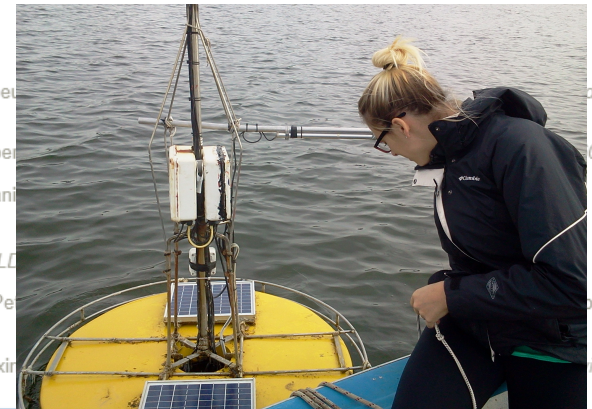
ntogenetic diet shift of pikeperch, *Sander lucioper*

L. (2011). Fate of allochthonous dissolved organi

n Markov logic networks using an RDBMS. *PVL*

ingstone, D. M., Markensten, H., Marzec, G., Pe

C. H., & Gaiser, E. (2011). Derivation of lake mixing



Mission: *GLEON conducts innovative science by sharing and interpreting high-resolution sensor data to understand, predict and communicate the role and response of lakes in a changing global environment*



heat wave impact on crustacean zooplankton. *Freshwater Biology*, 55, 1103-1113.

(2010). *Anguillicoloides crassus* infection of European eel, *Anguilla anguilla* (L.), in inland waters of Estor

of introducing the invasive amphipod *Gmelinoides fasciatus* into large shallow Lake Peipsi: present dist

Hu, Y. H. (2010). Control of dissolved oxygen in northern temperate lakes over scales ranging from min



Lake Sunapee, USA



Ormajärven, Finland



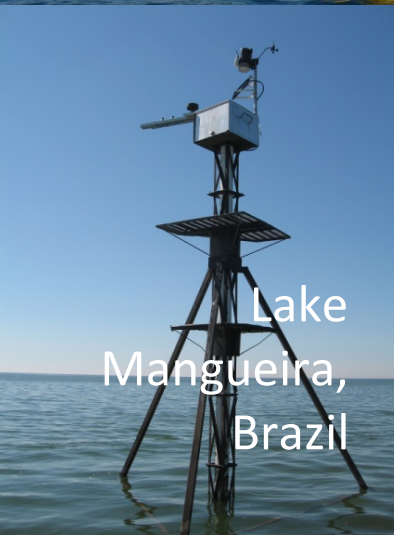
Torrens Lake, Australia



Yuan Yang Lake, Taiwan



Lake Mangueira, Brazil



Crystal Bog, USA



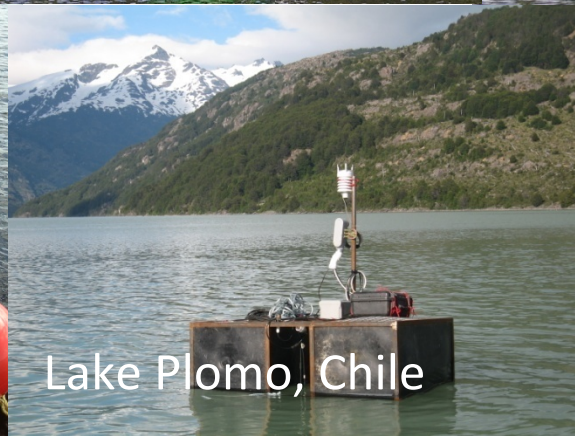
Lake Rotorua, NZ



Lake Erken, Sweden



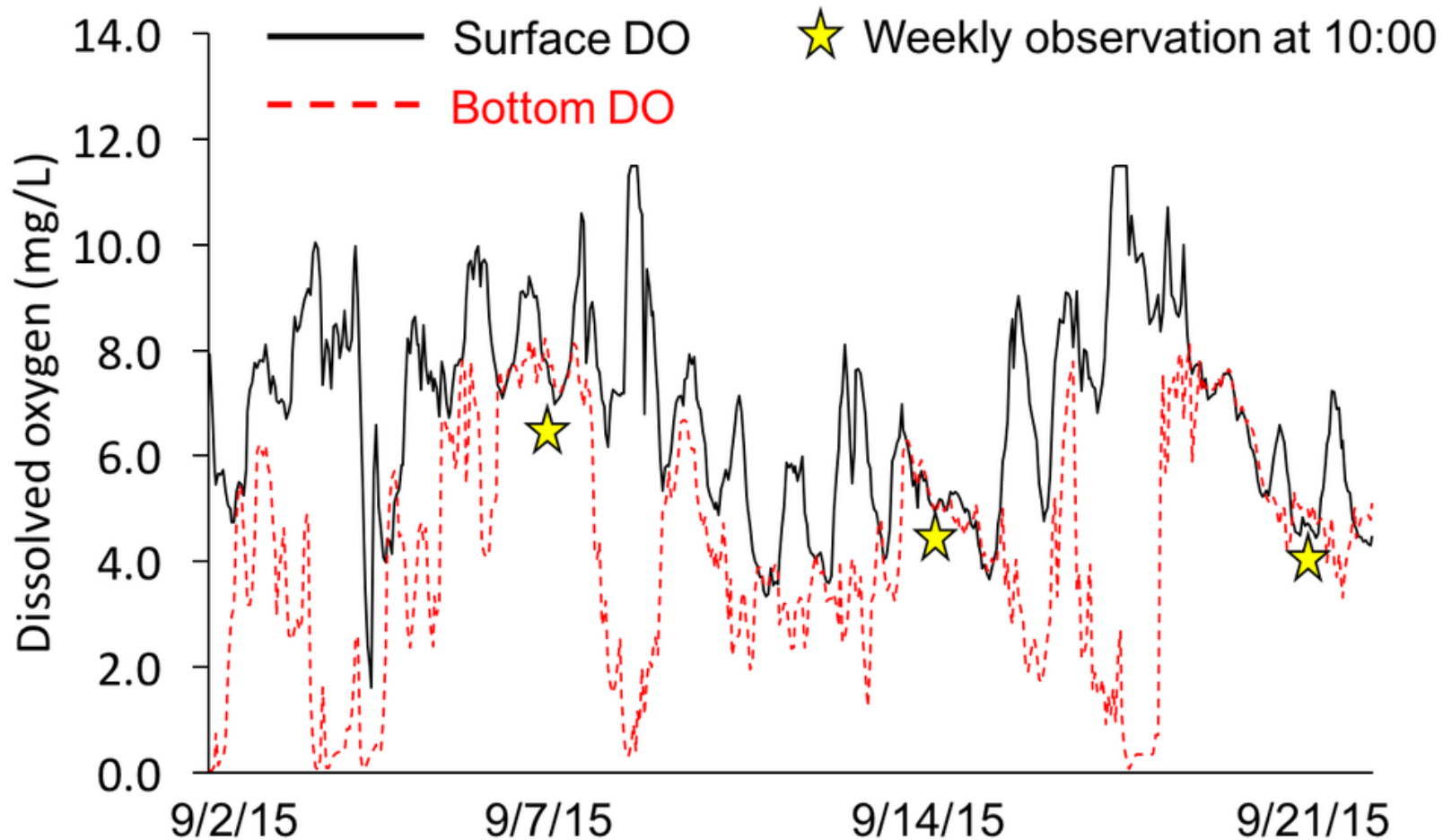
Lake Plomo, Chile



Lake Annie, USA



Why High Frequency (HF) Data?



DO measurements from sensors and weekly observations on Shelburne Pond, VT
Source: Jason Stockwell, @dvm_uvm

GLEON HF Data Sharing Model

- Overall philosophy: opportunity to collaborate, not just to share data (and ideas)
- Creating cyberinfrastructure for streaming data proved too challenging
- Researchers rely on requesting and sharing data via email on a project-by-project basis
- Curated datasets are published online (e.g., GLTC lake temperature database)
- **NEW!** EDI project <http://environmentaldatainitiative.org/>


nature.com > scientific data > data descriptors > article

SCIENTIFIC DATA

Altmetric: 96 Views: 17,657 Citations: 6 [More detail >>](#)

Data Descriptor | [OPEN](#)

A global database of lake surface temperatures collected by *in situ* and satellite methods from 1985–2009

Sapna Sharma , Derek K Gray [...] Kara H Woo

Scientific Data 2, Article number: 150008 (2015)
doi:10.1038/sdata.2015.8
[Download Citation](#)

Received: 17 November 2014
Accepted: 13 February 2015
Published online: 17 March 2015

Climate change Climate-change ecology
Limnology

GLEON at the INTERFACE

New “experiments” for engaging with the Public

Expanding the network, shaping the dialogue



Lake Sunapee Protective Association Dashboard



SEARCH: Show All

WEATHER

ABOUT

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Welcome to LSPA Live Buoy

12/17 01:24 PM



Avg Wind Speed (mph)



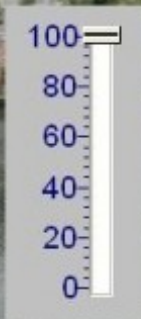
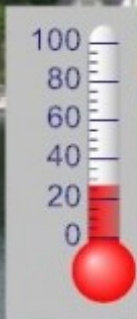
Wind Direction



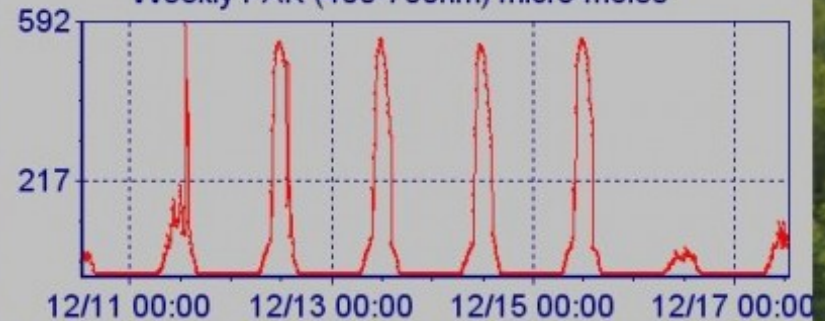
Max Wind Speed (mph)

Air Temp F

Humidity %



Weekly PAR (400-700nm) micro-moles



Today's Water Temperature F

3°

Weekly Dissolved Oxygen mg/L

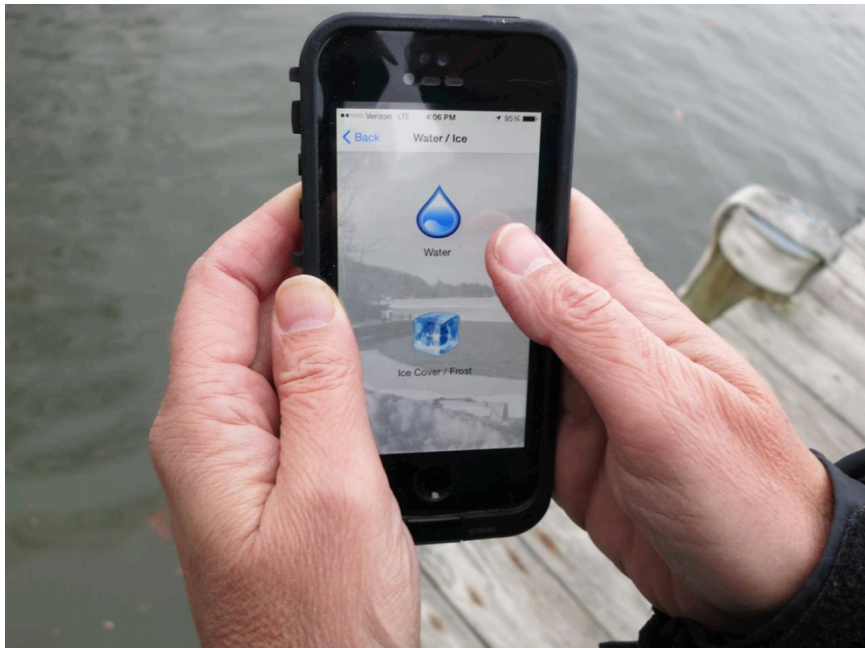
New! GLEON Citizen Science Working Group

- Formed in July 2016 at GLEON 18 meeting in Austria
- Includes NETLAKE citizen science projects in Europe
 - Water quality monitoring
 - Tea bag experiments
 - Microplastics research
- Existing and new GLEON projects
 - LakeObserver app
 - Art and Science



Citizens & science

GLEON LakeObserver App

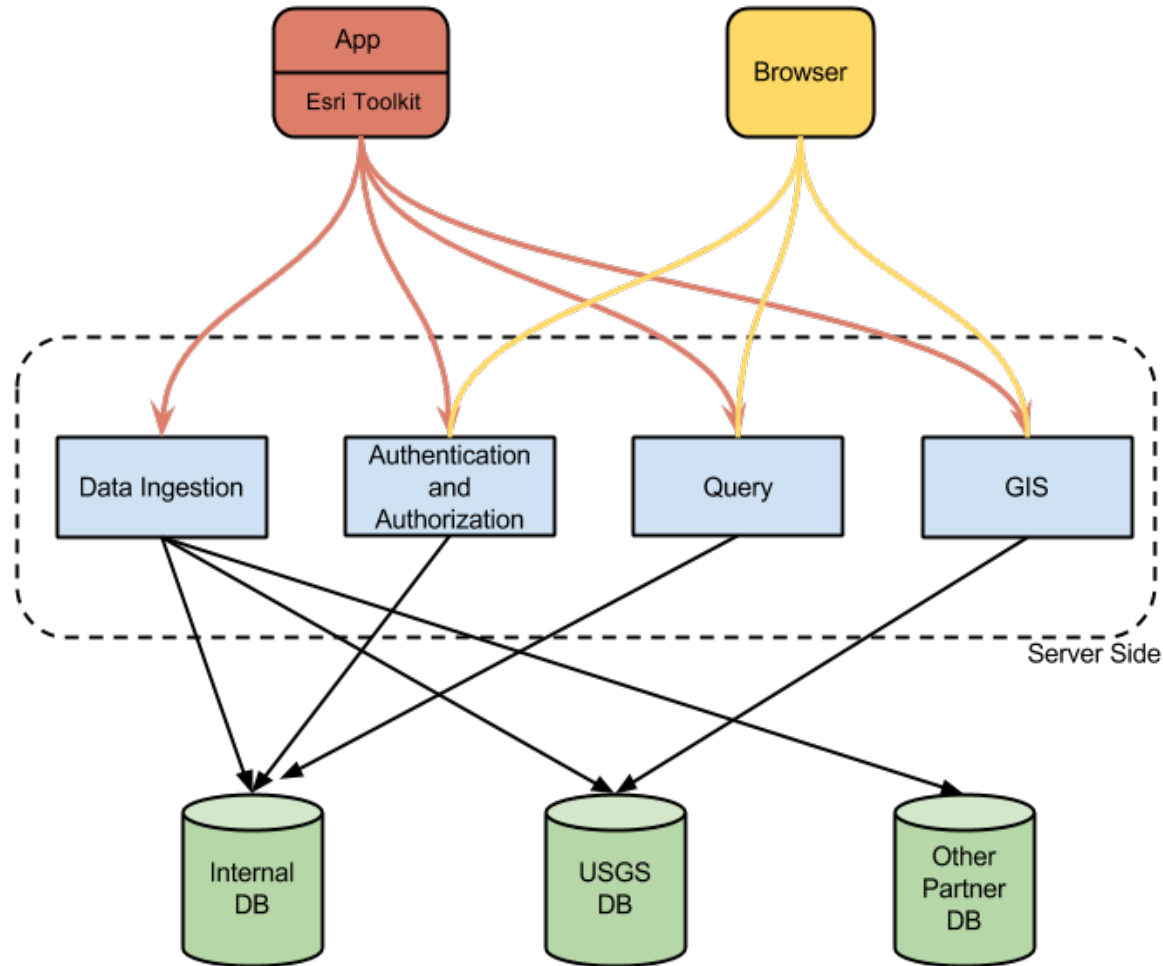


- White House **Climate Data Initiative (CDI) Partnership:**
GLEON Team App -Esri-USGS
- White House **Water Summit Commitment: Secchi Dip-In**
GLEON-NALMS-USEPA
- Crowd-sourced data
 - Citizen scientists
 - Research scientists
- Geographically referenced and accessed
- Data publicly available
- Visualization tools (in development)
- **New!** NETLAKE (~36 lakes in Europe) and Lake Pulse (~ 800 lakes in Canada) projects to use the app starting in 2016-2017

A mobile application for recording lake and water observations across the globe by citizens and scientists. K.C. Weathers, K.L. Chiu, H.A. Ewing, L. Borre, J. Mihalko, B. Chrobot, LSPA et al. (Session C4 NALMS 2016)

www.lakeobserver.org

LakeObserver Data Sharing Model



(Water Quality Portal)

Note: Communication between server-side modules is not shown.

LakeObserver Data Visualization (in development)

Lake Observer
A Mobile App For Recording Lake And Water Observations

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Search Results

[Table View](#) [Map View](#) [My Data](#)

Map Results



Lake Observer
A Mobile App For

Algae Map

A satellite map of a lake with a red pin indicating an observation location. The map shows a large body of water with many small boats docked along the shore. A red pin is placed on the water. The Google logo is in the bottom left, and 'Imagery ©2016, Commonwealth of Virginia, DigitalGlobe, U.S. Geological Survey, US' is in the bottom right.

Recent Observations

1.	Borrel added Secchi data for Back Creek, Annapolis, MD, USA, 38.9645568, -76.479682 with Latitude 39, Longitude -76, recorded on 27th of October 2016 at 01:30:02 AM	1.	Three New Added in 2016
2.	Caitlynsiharath91 added Cloud Cover data for Lake Thunderbird with Latitude 0, Longitude 0, recorded on 25th of October 2016 at 01:11:15 PM	2.	New Train
3.	Caitlynsiharath91 added Air data for Lake Thunderbird with Latitude 0, Longitude 0, recorded on 25th of October 2016 at 01:10:56 PM	3.	New (iOS)
4.	Borrel added Algae data for Back Creek, Annapolis, MD, USA, 38.9645568, -76.479682 with Latitude 39, Longitude -76, recorded on 24th of October 2016 at 02:20:26 AM	4.	Android a Beta Testing
5.	Borrel added Wind data for Back Creek, Annapolis, MD, USA, 38.9645568, -76.479682 with Latitude 39, Longitude -76, recorded on 24th of October 2016 at 02:19:56 AM	5.	Lake Obse

Search Results

[Table View](#)
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Secchi Results

Latitude	Longitude	Water Body	Site	Water Body Type	Date/Time	Water Depth	Secchi Depth	Sampling Platform
59.4629949	16.1870276	Mälaren	Galten	Lake/pond/reservoir	2016-10-03 13:14:04	2	0.55	Boat/Canoe
41.079608	-85.9524377	McClures Lake, Kosciusko County, IN, USA	IN557	Lake/pond/reservoir	2016-06-28 22:52:16	8.7	0.6	Boat/Canoe
44.5541127	-69.876528	Great Pond, Kennebec County, ME, USA, 44.5314445, -69.8582078	GP2	Lake/pond/reservoir	2016-06-30 16:07:49	19.81	6	Boat/Canoe
44.3814	-73.1556	Shelburne Pond	SP 3-3	Lake	2016-06-27 19:15:30	4.23	0.78	Boat/Canoe
38.9634245	-76.4802905	Back Creek, Annapolis, Anne Arundel County, MD, USA	Marinas_Port Annapolis	River/stream	2016-07-20 17:54:18	3	0.71	Dock/Pier
44.1371556	-70.2519672	Lake Auburn, Androscoggin County, ME, USA	8	Lake/pond/reservoir	2016-06-23 14:38:27	35	10.15	Boat/Canoe
41.4846715	-73.3253777	Lake Lillinonah, Fairfield County, CT, USA	Shepaug	Lake/pond/reservoir	2016-08-25 19:08:15	6.1	2.25	Dock/Pier

[GET BACK](#)
[DOWNLOAD RESULT](#)

Some Lessons from GLEON:

Data Sharing, Storage and Analysis

- Collaboration is key
- Engagement of citizen scientists helps shape the research agenda and increase the data available for analysis
- Ability to explore and share data is crucially important, especially for citizen scientists
- Cyberinfrastructure for HF (and citsci) data is an ongoing experiment
- Tools are a high priority:
 - recording (e.g., app)
 - storing (e.g., DateOne repository)
 - visualizing (e.g., LSPA dashboard)
 - analyzing (e.g., LakeAnalyzer)
 - sharing data (e.g., DateOne, Water Quality Portal)





GLEON

Networked lake science

Global Lake Ecological Observatory Network

Thank you!

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www.gleon.org

www.lakeobserver.org

Twitter: @GLEONNetwork @lisa_borre

facebook.com/GLEONNetwork

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