



# NEW YORK STATE WATER RESOURCES INSTITUTE

Department of Biological and Environmental Engineering

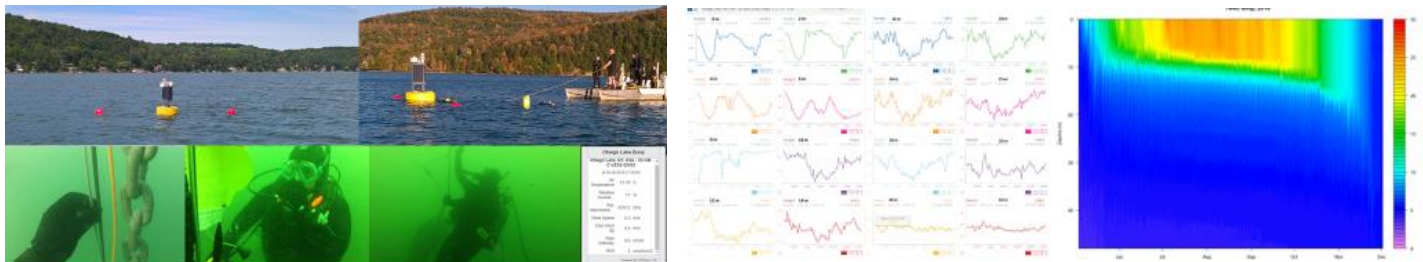
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## Otsego Lake Water Quality Constant Monitoring System

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### Abstract

High resolution, 24/7 water quality monitoring on Otsego Lake, Otsego County, NY was initiated with deployment of light and temperature loggers on a chain suspended from a marker buoy. It was subsequently upgraded to a full featured constant lake monitoring data buoy with real time data transmission capability, while the loggers are still used during winter for continuous data collection under ice. With NYSWRI support, we successfully established reliable field protocols for swapping of the logger chain with the data buoy at ice-out, maintenance of the data buoy throughout the open water season, and winterization of the data buoy anchoring system and attachment of the data logger chain after complete lake mixing. Real time data on select weather and water quality parameters from the data buoy have been made available to the public through the Otsego Lake Association web site as well as co-PI Yokota's web page. Otsego Lake became a member site of the Global Lake Ecological Observatory Network (GLEON), and recent data sets from the constant monitoring have been used in various GLEON research projects aiming to understand regional and global patterns in how lakes respond to changing climate and other anthropogenic influences. (195 words)

### Three Summary Points of Interest

- Successful development of year-round high frequency water quality data collection scheme on Otsego Lake
- Data sharing with local stakeholders and regional and global research networks
- Student training in data buoy deployment and maintenance, safe underwater work, and data processing and interpretation

*Keywords: climate change, lake temperature, climate sentinel, lake stratification, turnover, ice-in/out, winter limnology, high resolution data, long term data, GLEON, global trends*

## Otsego Lake Water Quality Constant Monitoring System

### Introduction

- High frequency & resolution data are needed to monitor & predict changes in lake water quality
  - Harmful algal blooms (HABs)
  - Local effects of climate change
- Data compatible for regional & global analyses through the Global Lake Ecological Observatory Network (GLEON) & SUNY Lakes Ecological Observatory Network (Fredonia, Oneonta & New Paltz)

### Results & Discussion

- Temperature and light logger-based data collection first
- Upgraded to a full featured lake data buoy with funding from the National Science Foundation
- WRI support realized optimal integration of the two systems for year-round data collection – temperature and light loggers on chain for under ice monitoring, data buoy with real time data transmission for ice-free seasons.
- Successful full ice-free season data collection in 2018 with the data buoy in 2018, fully capturing the processes of thermal stratification in spring and de-stratification in late fall.
- Data have been contributed to 5 GLEON projects to date; > 3 manuscripts currently in preparation by the research teams.

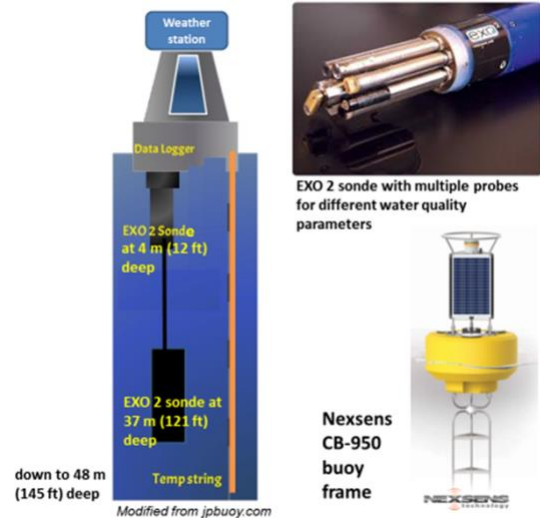
### Policy Implications

- Real-time weather & water condition data for the public, including:
  - agencies and nonprofits involved in regional planning (e.g., land use and climate resiliency) and conservation
  - paddlers, boaters, sailors, swimmers, & anglers
  - local businesses (e.g., marinas, resorts, tour boats)
  - regional and global network of researchers studying climate effects on lake water qualities
    - better prediction of water quality trends
    - proactive management strategies

### Methods

- Collects & transmits 46 water quality & weather parameters every 15 min, 24/7, during ice-free seasons (weather data only during winter)
- Full data set archived at a data center & shared with other researchers upon request

- Select real-time data shared with the public through Otsego Lake Association web site and co-PI Yokota's web page



### Outreach Comments

Presentations/displays at:

- NYS Soil and Water Conservation Committee Managers Meeting
- Empire Chapter - Soil and Water Conservation Society Annual Meeting
- Otsego County Water Quality Coordinating Committee
- Otsego County Conservation Association Earth Festival
- Otsego Lake Association
- Canadarago Lake Improvement Association

### Student Training

- Training opportunities for research SCUBA diving
  - 13 SUNY Oneonta students to date
- Locally relevant environmental data set for college students as well as K-12 STEM education
  - e.g., graph & compare air & water temperature at different depths



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### Presentations

Yokota, K. and P.H. Lord. 1 November 2018. Continuous lake monitoring buoy – lessons learned from the first year. 38th International Symposium, North American Lake Management Society, Cincinnati, OH, USA.

Yokota, K. and P.H. Lord. 18 October 2018. Otsego Lake water quality monitoring buoy. The 3rd Annual Upper Susquehanna Watershed Forum, Oneonta, NY, USA.

Bruesewitz, D., Yokota, K., Borre, L., Klug, J., Richardson, D., Weathers, K., and C. Wigdahl-Perry. 11 June 2018. Introducing undergrads to team science in lake research: Northeast GLEON. Association for the Sciences of Limnology and Oceanography Summer Meeting, Victoria, BC, Canada.

Yokota, K., Lord, P.H., Coney, S., Garfield, C., Murch, C., and K. Johnson. November 9, 2017. High-frequency limnological data collection: utility & challenges. 37th International Symposium, North American Lake Management Society, Westminster, CO, USA.

Additional final reports related to water resource research are available at <http://wri.cals.cornell.edu/news/research-reports>

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