

# Marine Instrumentation & Technology

at NOAA's Great Lakes Environmental Research Laboratory



The Marine Instrumentation Lab (MIL) located at NOAA's Great Lakes Environmental Research Lab (GLERL) is committed to the development, implementation, and technical support of marine instrumentation to enhance GLERL science in the Great Lakes and Marine ecosystems.

## Capabilities

- ◆ Electronic and Mechanical Design
  - Prototyping
  - Fabrication and Machining
- ◆ Electronic Testing
- ◆ Instrument Calibration & Repair
- ◆ Mooring Design & Assembly
- ◆ Equipment & Supply Warehousing

[www.glerl.noaa.gov](http://www.glerl.noaa.gov)

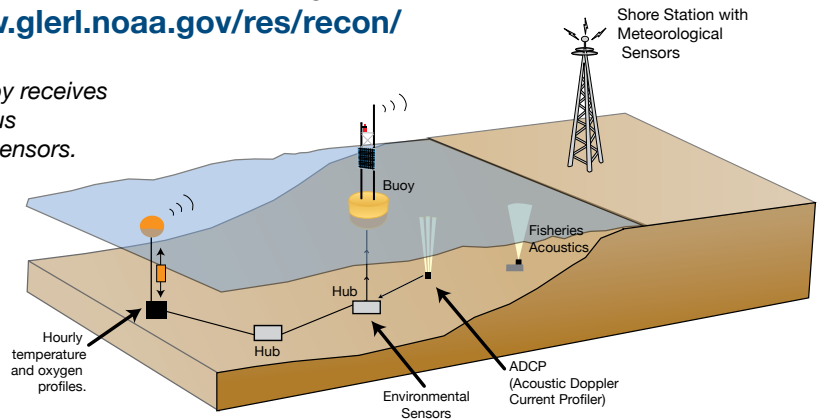


## RECON

The Real-Time Coastal Observation Network (RECON) is a national network of low cost coastal buoys capable of seabed to sea-surface observations. GLERL MIL staff designed and built the wireless internet observation systems that have been deployed at numerous sites in and around the Great Lakes basin. Each system collects meteorological data and provides sub-surface measurements of chemical, biological, and physical parameters. The observation network provides environmental data to state, federal, and university researchers, educators, and resource managers through the internet. Buoys are currently located in Lakes Huron, Erie, and Michigan.

<http://www.glerl.noaa.gov/res/recon/>

An offshore buoy receives data from various environmental sensors. The data are sent via a wireless link to an onshore receiver connected to the internet.



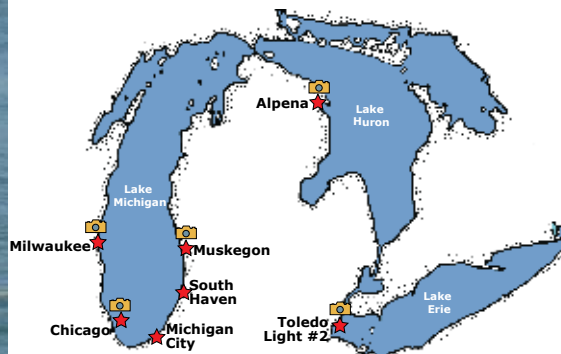
## RTMON

The Real-Time Meteorological Observation Network (RTMON) consists of stations in Wisconsin, Michigan, Illinois, Indiana, Ohio, and on Tennessee Reef in Layton, FL. Stations in Alpena, MI, Muskegon, MI, Milwaukee, WI, Chicago, IL, and Tennessee Reef, FL also include web cameras. All meteorological observation stations measure and record wind speed, wind gust, wind direction, air temperature, and wind chill. In addition, instruments in Muskegon measure dew point, relative humidity, atmospheric pressure, and light level, and the stations in Alpena and Michigan City also include a rain gauge sensor. The data as well as camera images are updated at 5-30 minute intervals and displayed on GLERL's website.

[www.glerl.noaa.gov/metdata](http://www.glerl.noaa.gov/metdata)

These meteorological observations are used in GLERL's Great Lakes Coastal Forecasting System to improve nowcasts and forecasts of wind, waves, water levels and lake circulation. <http://www.glerl.noaa.gov/res/glcfs/>

GLERL meteorological stations and web cam locations.



Met station at Toledo Light #2 is approx. 14.5 nautical miles (nm) from the mouth of the Maumee river in Toledo, OH.



## LPSS

The Laser Plankton Survey System (LPSS) is the modern version of the Plankton Survey System (PSS) that was initially assembled by GLERL MIL staff in 1997 to measure distribution and abundance of zooplankton, tiny waterborne crustaceans that serve as a food base for many species of fish. The system contains onboard instruments that measure chlorophyll  $a$ , photosynthetically active radiation (PAR), dissolved oxygen, conductivity, temperature, and zooplankton size and biomass density. The LPSS has been successfully used to survey physical, chemical, and biological conditions on Lakes Erie and Michigan.

The LPSS is towed behind a vessel in an up-and-down, or tow-yo fashion that retrieves data in a sinusoidal depth profile. A Laser Optical Plankton Counter (LOPC) measures zooplankton size, abundance, and depth distribution, and the fluorometer measures chlorophyll  $a$ , which helps to determine the abundance of algae that form the food base for zooplankton. A Photosynthetically Active Radiation (PAR) sensor measures light.

With the addition of the LOPC and updates to other instruments on the LPSS, GLERL scientists can now classify smaller size particles and more particles per second for a more accurate representation of zooplankton biomass in the water column.



## Selected Projects



### Tennessee Reef RECON Station

GLERL's newest RTMON station located in the Caribbean near Layton, FL on Tennessee Reef lighthouse is a cooperative project with NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) in Miami, FL. This RECON station includes a surface and underwater webcam, and instruments to measure currents and waves, air temperature, relative humidity, wind speed, and a fisheries acoustics platform used to measure fish biomass on the reef. This project will advance the development of software and hardware as well as improve scientific data collection methods.

[http://www.glerl.noaa.gov/res/archive/Task\\_rpts/2009/eosmason17-1.html](http://www.glerl.noaa.gov/res/archive/Task_rpts/2009/eosmason17-1.html)

### Lake Huron Sinkholes

Recently discovered submerged sinkholes in the Thunder Bay National Marine Sanctuary, located in Lake Huron off the coast of Alpena, MI, represent unique physical, chemical, and biological systems. Because there has been no study of submerged groundwater vents, little is known regarding the hydrology, biology, and geochemistry of submerged sinkholes.

A hydrographic instrument array, remotely operated vehicles (ROVs), and divers were used to collect data in these unique benthic habitats that are fueled by venting groundwater. GLERL MIL staff supplied and deployed the instrumentation and mooring platforms used in this study. This is a cooperative project with NOAA's Thunder Bay National Marine Sanctuary, The University of Michigan, and Grand Valley State University.

[http://www.glerl.noaa.gov/res/archive/Task\\_rpts/2006/eosruberg06-1.html](http://www.glerl.noaa.gov/res/archive/Task_rpts/2006/eosruberg06-1.html)

