Updating the UNF Low-cost Water Quality Buoy

Michael Toth, Patrick Welsh and J. David Lambert

Environmental Monitoring Mapping Analysis and Planning Systems (EMMAPS) Laboratory

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Buoy Design Criteria

Create a sheltered-water buoy capable of producing EPA approved water quality measurements

- Low cost, but survivable, buoy structure of easily obtained materials
- Self sufficient on solar power
- Human launchable, and easily transportable
- Dual mode wireless data telecommunications
- Small waterplane cross-section with high stability
- High quality instrumentation

Basic Operational Buoy (BOB) in STEM Education

- Ocean awareness in our schools is not high. Many children living in coastal communities do not have opportunities to get involved in estuarine and coastal issues. Most rarely visit the shore.

- BOB is a great concept for hands on learning in both science and technology while increasing awareness of coastal issues.

Why ABOB and RABOB?

- **ABOB Advanced BOB (not real-time)**
- **RABOB Real-time Advanced BOB**
- Advanced BOB concepts are designed to achieve two goals:
- Follow BOB effort in STEM education
  - Students build it themselves
  - Learn about parameters and sensors
  - Monitor the environment where they live
- Produce high quality environmental data
  - Understand importance of calibration
  - Look at environmental forcing over time

Where are we ?

- A version of RABOB has been built and deployed in a lake environment
- It has been connected wirelessly to a remote server and successfully transmitted four parameters in continuous sampling mode for 2 months
- It is pickup truck transportable and two man deployable with solar power and lightning protection, and using YSI datasondes.

Buoy Overview

Power-managed solar panel/
Sealed lead-acid battery

Spread spectrum 900 MHz radio
& text messaging communication

USCG approved navigation light

Integral lightning protection

Campbell Scientific data logger

YSI 6600 V2 Datasonde with
multiple water quality sensors

Structure Subsystem

- Schedule 40, 4” PVC pipe and fittings
- Angle aluminum frame
- 1/4” Lexan plastic, boatboard or 1/8”marine aluminum deck
- Stainless steel hardware
- Outrigger design for stability
- Small water plane cross-section
- Expanded foam sealing of pipes
- Reinforced sensor mounting point
- Three point moor (sun oriented)

Data Subsystem

- Standard SDI-12 protocol
- Campbell Scientific CR800 data logger
- YSI Data Sonde (options)

  Conductivity, Salinity, TDS, Redox, pH, Depth and level, Temperature, Dissolved oxygen, Nitrate, Ammonium and Ammonia, Chloride, Turbidity, Chlorophyll, Rhodamine, Phycocyanin, Phycoerythrin, Flow

- Atlantic Scientific lightning suppression
- Reserve power supply (12 Volts)
- NEMA 4X Enclosure

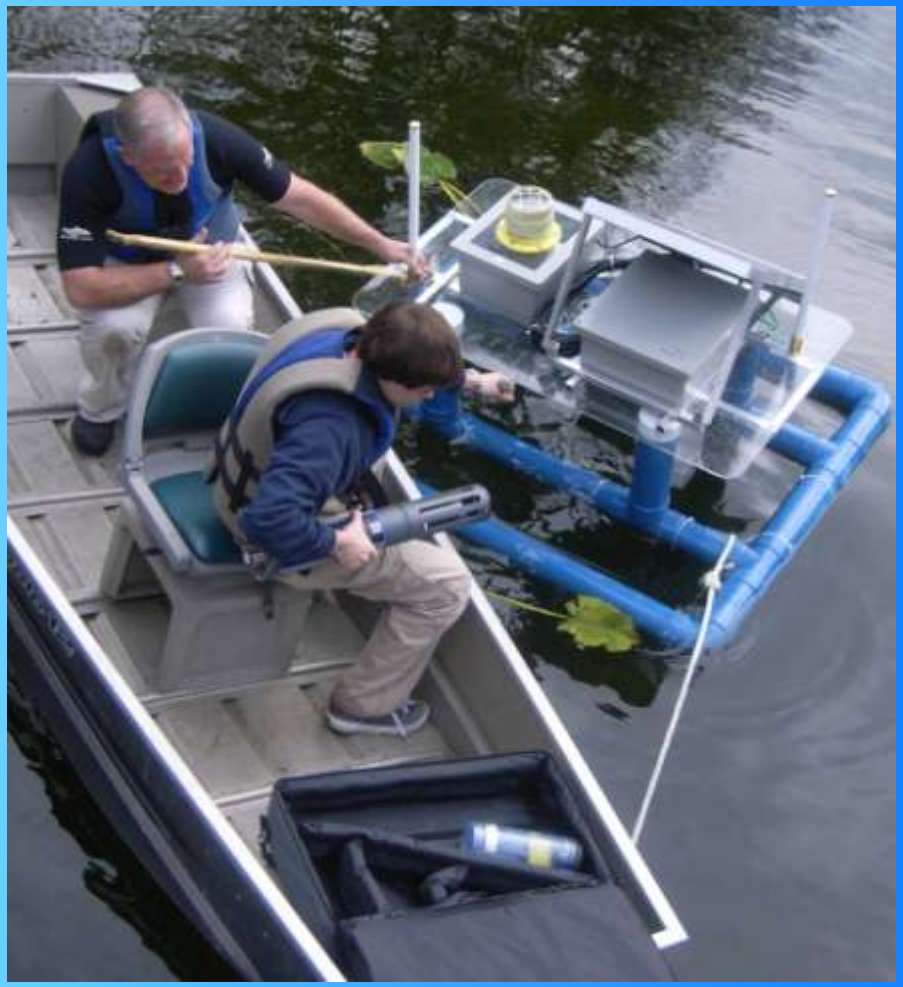
Lake Oneida Deployment

Removed from truck in two pieces:

- Instrument deck
- Float assembly

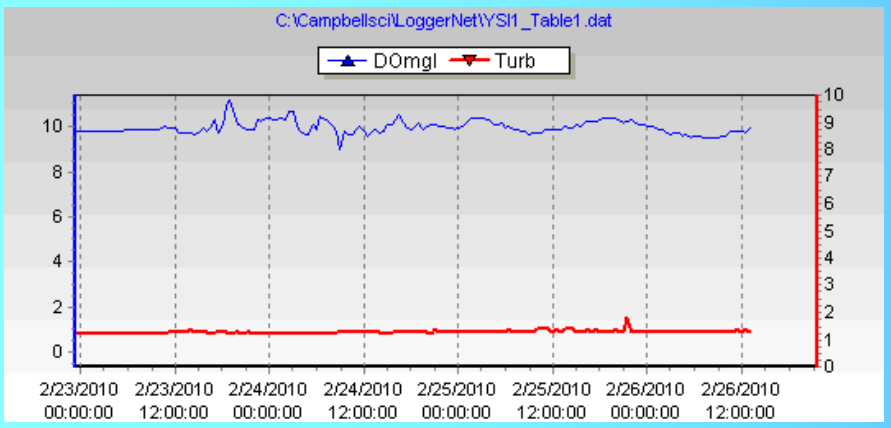
Mated at site and energized… Launched, towed and then anchored from johnboat or larger craft.

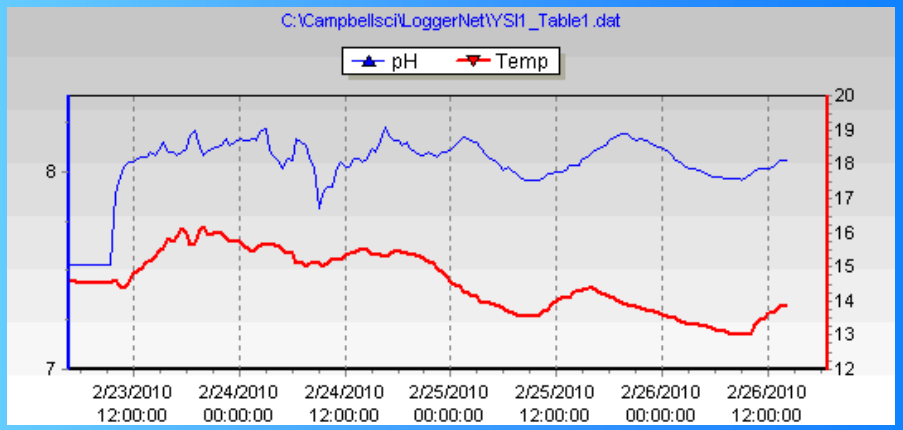
Lake Oneida Deployment

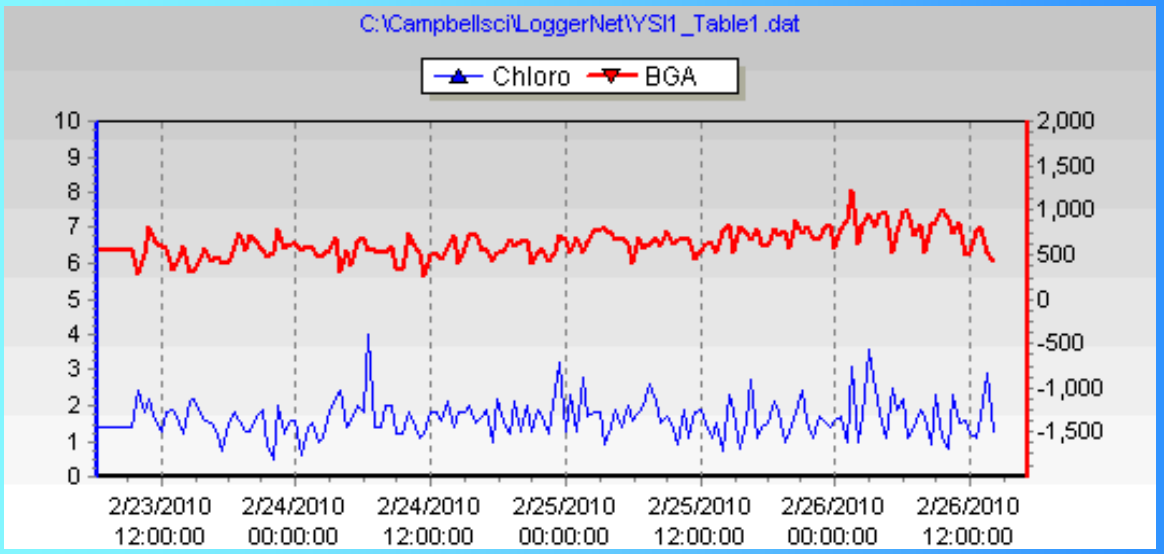


Lake Oneida Deployment Data

STEM Education anyone?







Where are we going?

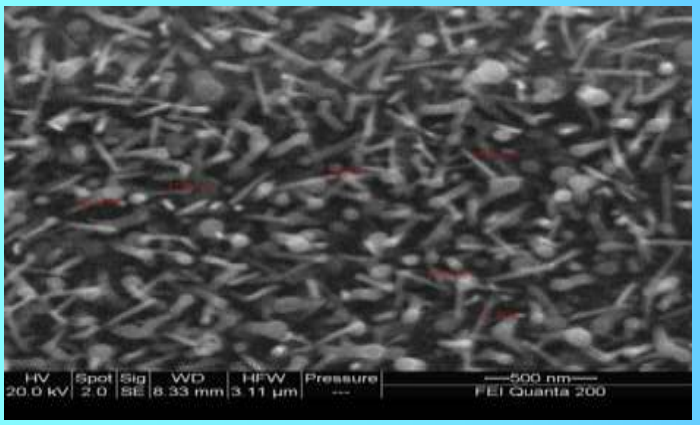
- SECOORA mini-grant to deploy and document RABOB performance while developing ABOB and CONOPS for STEM education use
- Larger SECOORA IOOS E&O Grant
- Partnering with Guana-Tolomato-Matanzas NERR to accomplish above while supporting their education mission and research.

SECOORA Mini-grant

- Partnering with GTMNERR for ABOB work

Future Sensors @ UNF

Thin-Film Indium-Tin Oxide (ITO) Gas Sensors



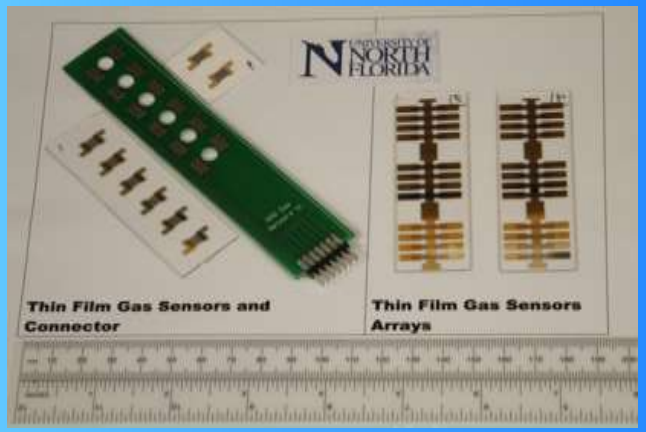
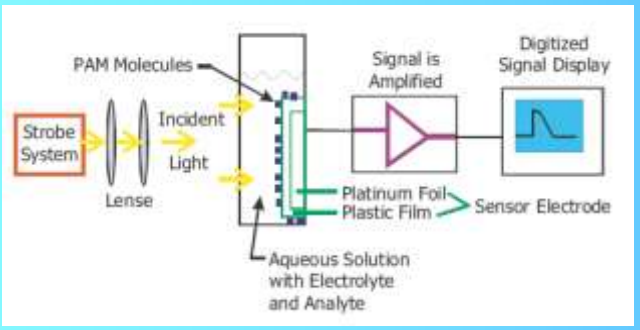


Photo-electric Chemical Sensors



Colorimetric Sensors