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OTT HydroMet | APPLICATION NOTES

Nutrient Monitoring in Northern Florida

Satlantic SUNA and WET Labs Cycle-PO_4

Real-time nitrate and phosphate analysis for ecosystem modeling

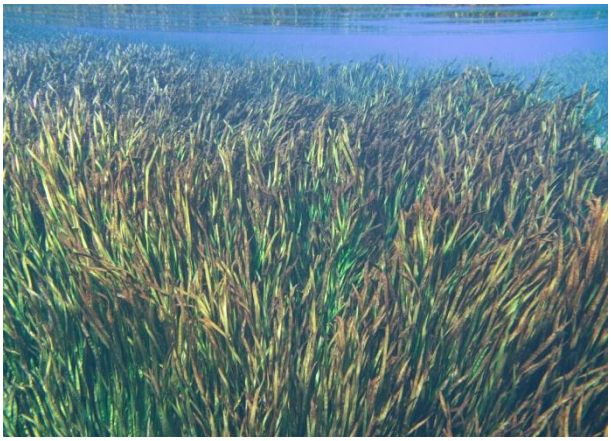
High water clarity at Ichetucknee Head Spring. Credit:Larry V. Korhnak

Background

- The karst springs of northern Florida drain the Floridan Aquifer, providing a unique window into a major Florida drinking water supply. The river ecosystems that the springs feed are incredibly productive and have been the focus of ecosystem research for over 60 years.
- The flow, chemistry, and temperature of the springs are remarkably constant, allowing any variation in chemistry at a downstream location to be clearly attributed to that section of the river.
- The Ecohydrology Laboratory at the University of Florida, with the support of the National Science Foundation and St. Johns River Water Management District, has been studying fine temporal scale variation in spring river water chemistry in response to day-night cycles.
- From the diel signals in dissolved oxygen, pH, temperature, nitrate, and phosphate, the University of Florida is able to study the inner workings of these extraordinary ecosystems in real-time, with the help of the Satlantic SUNA nitrate sensor and WET Labs Cycle-PO_4 phosphate sensor.

Task

- Explore the diel signals of nitrate, phosphate, and other chemical attributes of Florida's spring-fed rivers
- Understand the fate, transport, and transformations of potentially harmful contaminants
- Develop new tools for understanding how river ecosystems couple nutrient and energy resources together



Highly productive plant biomass in the Silver River. Credit: Larry V. Korhnak

Monitoring Solution

- Satlantic SUNA (Satlantic Ultraviolet Nitrate Analyzer) for long-term chemical-free nitrate measurement and longitudinal profiling, with measurement resolution of 0.5 Hz
- WET Labs Cycle-PO_4 for long-term moored phosphate measurement
- Multiparameter sonde for measurement of pH, DO, temperature, and specific conductance
- Hourly measurements over multiple short term (8-14 day) deployments at site 0.5 to 5 km downstream of spring vents

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The Advantages

- The SUNA and Cycle-PO_4 provide unparalleled insight into the short term variation of nutrient concentrations in rivers because accuracy and precision of both instruments *exceeds* the accuracy of field samples analyzed using standard laboratory methods.
- Sensor calibrations are stable and sensor construction is robust
- The temporal resolution is impractical to replicate without sensors. The Ecohydrology labratory at University of Florida has taken over 500,000 nitrate measurements with their SUNA's.
- Medium-term deployments have been problem free with biofouling protections

Satlantic SUNA Nitrate Sensor

WET Labs Cycle-PO_4 Phosphate Sensor

Summary

- The Satlantic SUNA and WET Labs Cycle-PO_4 have opened up new avenues for understanding how river ecosystems process nutrients

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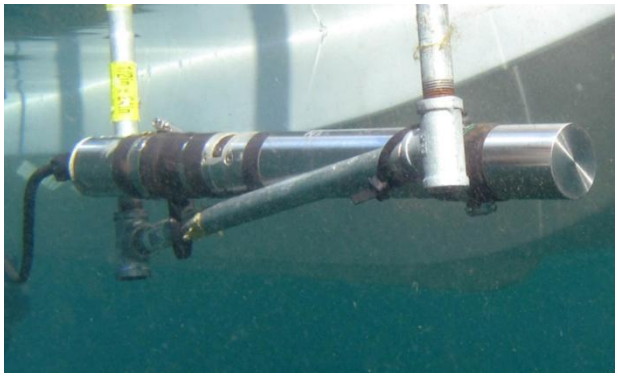
Find more information on products and solutions at www.otthydromet.com.

For more information on the monitoring project, visit the University of Florida Ecohydrology Lab site or contact Dr. Matthew Cohen at mjc@ufl.edu.

Article Citations

Heffernan, J.B., and M.J. Cohen. 2010. Direct and indirect coupling of primary production and diel nitrate dynamics in a sub-tropical spring fed river. Limnology and Oceanography 55:677-688



Above: SUNA deployed for longitudinal profiling. Credit: Larry V. Korhnak

Below: Sensor performance – May 2010. A) Multiparameter sonde for DO & specific conductance B) SUNA for Nitrate, C) Cycle-PO4 for phosphate. Vertical dashed lines denote midnight of each deployment day