

High Temporal Resolution Nitrate Monitoring

Nitrate-nitrogen is a water pollutant of significant concern in fresh and estuarine waters of Florida and beyond. Furthermore, nitrate enrichment of public water supplies could have public health consequences. Several high-profile local examples of where nitrate pollution may have impacted ecosystems include springs across north-central Florida and high resolution and automatic monitoring of nitrate concentrations of this water is required to assess potential harm from elevated nitrate concentrations. The overall goals of this project were to study two currently available nitrate sensors the Satlantic In-Situ Ultraviolet Spectrometer (ISUS) and the YSI 9600 Nitrate Monitor, and develop an ultraviolet (UV)-optical sensor for continuous nitrate monitoring in low flow, high DOC waters.

The Satlantic ISUS uses ultraviolet absorption spectrometry to measure in-situ dissolved chemical species. It is a chemical-free, solid-state instrument for accurate and continuous nitrate concentration measurements.

The YSI 9600 is capable detecting nitrogen/nitrate levels 0 to 10 mg/L. It uses flow injection technology and works on the standard cadmium reduction/diazotization principles as defined in literature from both the US EPA and Standard Methods for the Examination of Water and Wastewater.

The UV-optical sensor we are developing for continuous nitrate monitoring in low flow, high DOC waters uses an Oriel Minispectrometer (190 – 800 nm spectral range) and is controlled by a single board computer for low power consumption and high-performance computing. A GPS receiver was interfaced to the sensor for Lagrangian drift experiments to study the mobile nature of nitrate in fresh water systems of Florida.

The pros and cons of the two currently available nitrate sensors, as well as the progress developing a UV-optical sensor for continuous nitrate monitoring in low flow, high DOC waters will be discussed. Data collected during the test bed deployment of the sensor network in Ichetucknee Springs State Park will be presented.