

Measuring in-situ nitrate concentrations at high temporal resolution: Application of two in-situ technologies.

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Abstract

Characterizing nitrate concentrations in Florida Springs is an intensive process in accordance with current measurement procedures. With nitrate implicated as a potential cause of algal blooms and spring water quality degradation, this study is examining nitrate concentrations at high temporal (hourly) resolution in Ichetucknee Springs. A field evaluation of two commercially available nitrate sensors is underway. The two sensors are being tested under the Suwannee River Hydrologic Observatory's Santa Fe River Test Bed, a National Science Foundation WATERS Network Test Bed to better characterize nitrate concentrations. The first sensor completes in-situ colorimetric chemical analysis for nitrate using a YSI 9600 in-situ colorimeter and accompanying conductivity-temperature-depth (CTD) sonde; the second sensor package involves the adaptation of a Satlantic ISUS oceanic ultra-violet spectroscopic device for an in-situ freshwater application. Readings from both sensors are reported via cellular telemetry from the study site to a desktop computer for analysis using calibration algorithms developed from bench top testing and spectral analysis. Weekly grab samples are checked by liquid ion chromatography and field checked by a Hach colorimeter. Measurements are taken within the spring boil to best characterize the nitrate concentrations prior to biological uptake in the spring run and river. Developing a strong measurement covariance from the two sensor groups will lead to higher mass nitrate flux resolution and subsequent understanding of nutrient loads. These instruments will support further studies into nutrient fate and transport in the spring and river ecosystems. These real time data have the potential to better inform researchers and managers in their decision-making process for assessing nutrient impacts and subsequent management policies.

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