



Application of portable in situ UV fluorescence sensors in natural and engineered aquatic systems.

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Natural organic matter (NOM) is ubiquitous throughout aquatic systems. This heterogeneous mixture of organic matter is central for aquatic ecosystems and, both local and global, biogeochemical cycling. Improvements in technology and data analysis has allowed for advances in the understanding and characterisation of aquatic organic matter.

However, much of the technological expansions have focussed on benchtop instruments. In recent years, there has been interest in the continued development of portable in situ sensors for monitoring NOM characteristics within a wide range of applications, spanning both natural and engineered systems.

The UviLux (Chelsea Technologies Group Ltd., UK) is an in situ portable UV fluorescence sensor that can be configured to monitor a range of NOM in aquatic systems, as well as anthropogenic inputs such as polycyclic aromatic hydrocarbons (PAH) and optical brighteners. Here we will focus on the use of the Tryptophan and CDOM UviLux sensors across a variety of applications in both natural systems, such as rivers and leachate into groundwater, and engineered systems, including drinking water and waste water treatment. Recent work has focused on standardising the fluorescence output across the UviLux range of sensors, reporting data in quinine sulphate units (QSU), which enables the output from two different fluorometers to be directly compared both to each other, and to bench-top data. A key advantage of deploying multiple sensors is the ability to fingerprint the fluorescence, by providing, for example, a Tryptophan/CDOM ratio. From the data collected, the ratio of the different fluorescence regions has been shown to provide more robust in situ data and help identify true temporal variations and patterns across multiple applications and sampling locations.