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Understanding aquatic microbial processes using EEM's and *in-situ* fluorescence sensors

Bethany Fox (1), John Attridge (2), Cathy Rushworth (2), Tim Cox (1), Alexandre Anesio (3), and Darren Reynolds (1)

(1) University of the West of England, Bristol, United Kingdom, (2) Chelsea Technologies Group Ltd., United Kingdom, (3) University of Bristol, United Kingdom

The diverse origin of dissolved organic matter (DOM) in aquatic systems is well documented within the literature. Previous literature indicates that coloured dissolved organic matter (CDOM) is, in part, transformed by aquatic microbial processes, and that dissolved organic material derived from a microbial origin exhibits tryptophan-like fluorescence. However, this phenomenon is not fully understood and very little data is available within the current literature. The overall aim of our work is to reveal the microbial-CDOM interactions that give rise to the observed tryptophan-like fluorescence. The work reported here investigates the microbial processes that occur within fresh-water aquatic samples, as defined by the biochemical oxygen demand (BOD) test, as a function of the T_1 peak ($\lambda_{ex/em}$ 280/330-370 nm). A series of standard water samples were prepared using glucose, glutamic acid, BOD dilution water and a bacterial seed (Cole-Parmer BOD microbe capsules). Samples were spiked with CDOM (de-rived from an environmental water body) and subjected to time resolved BOD analysis and as excitation-emission fluorescence spectroscopy. All EEM spectral data was interrogated using parallel factor analysis (PARAFAC) in an attempt to determine the presence and dominance (relative intensities) of the CDOM-related and T_1-related fluorophores within the samples. *In-situ* fluorescence sensors (Chelsea Technologies Group Ltd.) were also used to monitor the T_1 fluorescence peak (UviLux Tryptophan) and the CDOM fluorescence peak (UviLux CDOM) during experiments. Tryptophan-like fluorescence was observed (albeit transient) in both spiked and un-spiked standard water samples. By furthering our understanding of aquatic organic matter fluorescence, its origin, transformation, fate and interaction with aquatic microbiological processes, we aim to inform the design of a new generation *in-situ* fluorescence sensor for the monitoring of aquatic ecosystem health.