Microbial transformation of aquatic DOM in freshwater systems

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Dissolved organic matter (DOM) in freshwater aquatic systems is a key factor within global biogeochemical cycling [1]. Freshwater systems provide transportation of nutrients along the aquatic continuum, with aquatic DOM underpinning the microbial foodweb and playing an essential role in supporting and maintaining the aquatic ecosystem. Literature indicates that microbial-DOM feedbacks are crucial for the transformation and production of labile, and recalcitrant, DOM [2]. However, the interactions between the microbial population and DOM are not that well understood.

Aquatic DOM has been broadly characterised by its fluorescing properties, so called aquatic organic matter fluorescence [1,3], as shown below (Fig. 1).

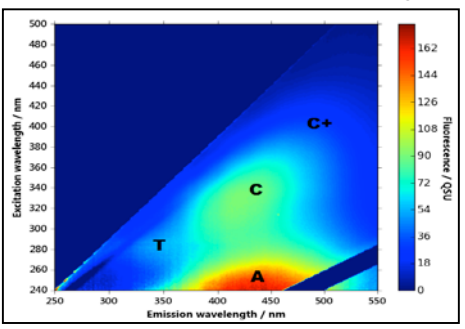

Figure 1: Excitation-emission matrix (EEM) of common aquatic organic matter fluorescence peaks [1].

Our research investigates the production of microbially derived DOM via bacterial metabolic pathways. We show the development and production of aquatic organic matter fluorescence from quantified living bacterial populations (flow cytometry). Our findings show that aquatic organic matter fluorescence can be used to monitor microbial-DOM interactions. Such discovery will further the development of novel in-situ fluorescence based sensors that enable the monitoring of aquatic ecosystem health.

[1] Coble *et al*. (2014) Aquatic Organic Matter Fluorescence. [2] Hudson *et al*. (2007) *River Res. and Applications* **23(6)**, 631-649. [3] Carstea *et al*. (2014) *Water Res*. **61,** 152-161.