Geophysical Research Abstracts
Vol. 16, EGU2014-11506, 2014
EGU General Assembly 2014


# Analysing Submarine Groundwater Discharge (SGD)-borne Dissolved Organic Matter (DOM) in a karstic aquifer, Co. Galway, Ireland.

Tara Kelly and Carlos Rocha
Trinity College Dublin, Ireland (kellyt7@tcd.ie)

Submarine Groundwater Discharge (SGD) constitutes an "invisible" link between land and sea, transporting allochthonous and autochthonous dissolved organic matter (DOM), nutrients and metals to the ocean via the subterranean estuary. The latter acts as a powerful bioreactor where groundwater, in transit from land to sea, mixes with seawater leading to active modulation of both DOM content and chemical makeup of SGD. DOM in freshwater systems is a key component of the global carbon cycle. Climate change may hence increase the concentration of allochthonous carbon entering the oceans as terrestrial DOC is released from soils at higher temperatures, and transported via SGD. Presently, little is known about the effects of SGD-borne DOM on coastal carbon cycling.

SGD therefore represents a dynamic reservoir and analysis is critical to forecast future environmental management programmes, both on a local and global scale. Labile DOM plays a crucial role in microbial remineralisation processes, and as it breaks down it contributes to the groundwater nutrient pool. Locally, this could add to eutrophication. However, if refractory carbon is present, it will be recalcitrant to mineralisation in transit and at the subterranean estuary. This putative additional input will thus imply the contribution of SGD to oceanic carbon storage.

This study is focused on Kinvara Bay (Galway, western Ireland), the focal point for waters discharging from the Gort-Kinvara karstic aquifer. This aquifer represents the ideal study location for evaluation of SGD contribution to the coastal DOM pool, as SGD is focused in the bay, surface drainage is very limited, and groundwater travels across a large catchment area with a short residence time, minimising DOM modification in transit. DOM samples collected in the field have been analysed using Three-Dimensional Excitation Emission Matrix Fluorescence (3D-EEMF) and High Temperature Catalytic Oxidation. PARAFAC is subsequently used as a tool to elucidate the types, sources (marine vs terrigeneous) and fractional composition of DOM, both in SGD plumes and in surface waters.