Behaviour of submarine groundwater discharge-derived DOM fluxes to coastal ocean

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Terrigenous dissolved organic matter (DOM) has a major influence on ecosystems and the carbon cycle in coastal oceans [1, 2]. An increasing number of studies show the importance of integrating the contribution of submarine groundwater discharge (SGD) to coastal carbon budgets [3, 4]. However, the behaviour of SGD-derived DOM fluxes to the coastal ocean remains poorly understood. Within the context of climate change and the inevitable sea-level rise, the impact of buried soil horizons on carbon fluxes needs to be understood in order to assess the consequences of the landward migration of the coastline on the biogeochemistry of coastal oceans.

In this context, the main objective of this project is to study the dynamics of terrigenous DOM from SGD in the coastal ocean. Geochemical, isotopic and hydrogeological approaches will be applied in order to i) spectroscopically, molecularly and isotopically characterize SGD-derived DOM, ii) quantify the DOM fluxes to coastal waters and iii) determine tidal and seasonal variability of DOM dynamics.

Two study sites located in the Gulf of St.Lawrence (Magdalen Islands and Chaleurs Bay) will allow us to study the behaviour of terrigenous DOM originating from the degradation of old submerging peaty soils. Piezometers equipped with pressure sensors will be inserted into the beach, allowing the continuous measurement of the water table levels and the determination of hydraulic gradients. The geochemical monitoring will be based on the measurement of ^{222}Rn activity in the discharge zone of the SGD. In addition, the measurements of DOC, $\delta^{13}C$-DOC, $\Delta^{14}C$-DOC, CDOM and lignin degradation products will allow to apportion the SGD-DOM pool between the different potential sources and quantify the DOM effluxes from the beach.

[1] Burnett *et al.* (2006) *Sci. Total Environ.* 327: 498-543. [2] Couturier *et al.* (2016) *Mar. Chem.* 186: 46-57. [3] Robinson *et al.* (2017) *Adv. Water Resour.* [4] Kim & Kim (2017) *Sci. Rep*.