EGU2020-7563
https://doi.org/10.5194/egusphere-egu2020-7563
EGU General Assembly 2020

Dynamics in the isotope biogeochemistry of a SGD-impacted coastal aquifer after a storm event

Anna-Kathrina Jenner[1], Julia Westphal[1], Bo Liu[2], Iris Schmiedinger[1], and Michael Böttcher[1]
[1]Leibniz Institute for Baltic Sea Research, Marine Geology, Rostock, Germany
[2]Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Marine Geochemistry, Bremerhaven, Germany

The interface of land and sea is of particular interest regarding the exchange of elements, like nutrients, carbon and sulfur. Submarine groundwater discharge (SGD) is an important pathway for element exchange from the terrestrial to the marine environment and vice versa. The discharging water can not only consist of fresh ground water but also of a considerable proportion of recirculated often brackish seawater.

Here, we followed the water and element exchange and associated biogeochemical transformation processes in front of a rewetted peatland at the southern Baltic Sea. Vertical pore water profiles were retrieved via up to 5 m long multi-port pore water samplers on a seasonal base. An extrodinary storm event in early 2019 not only led to the partial flooding of an associated coastal peatland with brackish water but also pushed Baltic Sea water into the coastal aquifers allowing to investigate the time-dependent return to previous subterrestrial ‚normal' conditions via SGD-induced freshening. Weekly sampling was carried out to follow the changes after the storm event in the sediments in front of a coastal peatland. Here we present new results of the pre- and after storm event pore water profiles. A focus was set on the investigation of tracers for concentration gradients of major and redox-sensitive trace elements, nutrients and the stable isotope composition (H, C, S, O) of water, dissolved inorganic carbon (DIC) and sulfate to understand the mixing processes and superimposing biogeochemical transformation reactions.

We found evidence for a strong control of the bottom-pore water exchange by lithology and a high activity of dissimilatory sulfate-reducing microorganisms in the coastal sediments leading to the accumulation of substantial DIC superimposed by corrosion of sedimentary carbonates.

Acknowledgement: This study is supported by the DFG research training group Baltic TRANSCOAST and the Leibniz IOW.