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# The ballad of noble gases, paleoclimate and groundwater in the sea

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Atmospheric noble gases enter aquatic systems by gas / water partitioning. Therefore, aquatic noble gas concentrations in waters reflect the physical conditions prevailing during gas exchange. Consequently, applications of dissolved atmospheric noble gases are constrained to the analysis of gas partitioning processes between phases, but also allow the reconstruction of past environmental / climate conditions [1]. These concepts in concert with the mechanistic understanding of the gas / water partitioning in porous media allow e.g. to reconstruct ground water recharge in Northern America in response to the last glaciation [2, 3].

Novel experimental methods enable to determine noble gas concentrations in minute amounts of water (< 1 mg, 4) and in the porewater of sediments allowing to retrieve past environmental information from fluid inclusions in speleothems [5] and to analyze fluid transport in the vicinity of black smokers [6] and the origin of 'fresh' water in ocean sediments.

We present noble gas concentrations in the porewater of sediments of Baltic Sea. The observed excess in atmospheric gases (as well as the reconstructed environmental conditions during infiltration) identify the porewater to be groundwater having recharged at the German mainland. The groundwater was emplaced in the sea sediments during the stable and warm climatic of Holocene when the sea level of the Baltic Sea started recover from its glacial low stand.

The presentation aims to open the discussion on how noble gases might help to analyze groundwater dynamics in the ocean and ocean sediments.

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