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Groundwater flow between a coastal peatland and the Baltic Sea – Field measurements and modelling

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Coastal peatlands are characterized by intense interactions between land and sea, comprising both a submarine discharge of fresh groundwater and inundations of the peatland with seawater. Nutrients and salts can influence the biogeochemical processes both in the shallow marine sediments and in the peatland. The determination of flow direction and quantity of groundwater flow are therefore elementary. Submarine groundwater discharge (SGD) has been reported from several locations in the Baltic. The objective of this study is to identify the governing processes that cause the exchange of fresh and brackish water across the shoreline in a coastal peatland in Northeastern Germany, and to assess the influence of a low-permeable peat layer extending into the Baltic Sea.
Below the peatland, a shallow fine sand aquifer differs in depth and is limited downwards by glacial till. Water level and electrical conductivity (EC) are permanently measured in different depths at eight locations. First results indicate a general groundwater flow direction towards the sea. Electrical conductivity measurements suggest different permeabilities within the peat layer, depending on its thickness and degradation. Near the beach, EC fluctuates partially during storm events due to seawater intrusion and reverse discharge afterwards. The groundwater flow will be verified with a 3D model considering varying thicknesses of the aquifer and the ditch network.