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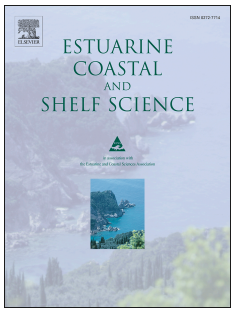

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Biogeochemical impact of submarine ground water discharge on coastal surface sands of the southern Baltic Sea

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Abstract

This study evaluates the effect of submarine ground water discharge (SGD) on biogeochemical processes of sandy sediments of Hel Bight (Poland) in the shallow southern Baltic Sea, using stirred benthic chambers combined to seepage meters, deep pore water profiles and a reactive transport model. The main impacts of fresh anoxic groundwater seepage are due to (1) the efflux of methane; (2) the efflux of phosphate and silicate; (3) the efflux of dissolved organic carbon (DOC) of aquifer origin. Methane from SGD is assumed to be only slightly oxidized within the sediments and potentially reach the atmosphere at a maximum rate of 30 mmol CH_4 m^{-2} d^{-1}. Silicate and phosphate supplied by SGD promote a seep-site net community production rate that is more than twice as compared to adjacent non seeping sites (70 and 30 mmol C m^{-2} d^{-1} respectively). However, oxygen uptake rates at the seep site during the night (30 mmol O_2 m^{-2} d^{-1}) are lower than those observed at the reference sites (50 mmol O_2 m^{-2} d^{-1}). We hypothesize that autogenic, relatively labile DOC is available at the reference site, leading to