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New Rhizon in situ sampler for pore water studies in aquatic sediments: For example nutrient input from submarine groundwater discharge in costal areas.

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To investigate coastal biogeochemical cycles, especially at the sediment/water interface, improved sampling methods are necessary. For this purpose, we developed a pore water in situ sampler with miniature sampling devices, so called Rhizons. Rhizon soil moisture samplers have been used as sampling devices in unsaturated soils for the last ten years. In aquatic science they have been rarely used to extract pore water from sediments. This study presents a new developed Rhizon In Situ Sampler (RISS) as a non-destructive and inexpensive tool for in situ pore water sampling. Field experiments, tracer studies and numerical modeling were combined to assess the suitability of Rhizons for pore water sampling. Our investigations show that the RISS is a very suitable alternative to classical methods for in situ sampling. Combined with an in situ benthic chamber system the RISS allows studies of benthic fluxes and pore water profiles at the same location with negligible effect on the incubated sediment water interface. This allows improved calculation and modeling of transport and reaction processes. Results of nutrient and freshwater input into surface water derived by in situ sampling of tidal flat sediments of the Wadden Sea (Sahlenburg/Cuxhaven, Germany) are presented. Long term deployments of the RISS and repetitive pore water sampling at the same location might support future studies of seasonal variation of benthic processes in sediments of the coastal zone and open ocean.