A MULTI-TRACER STUDY OF SUBMARINE GROUNDWATER DISCHARGE INTO WISMAR BAY, SOUTHERN BALTIC SEA.

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AIM: To understand the impact of SGD on the development of chemical gradients regarding to element fluxes into coastal zones by applying different tracers.

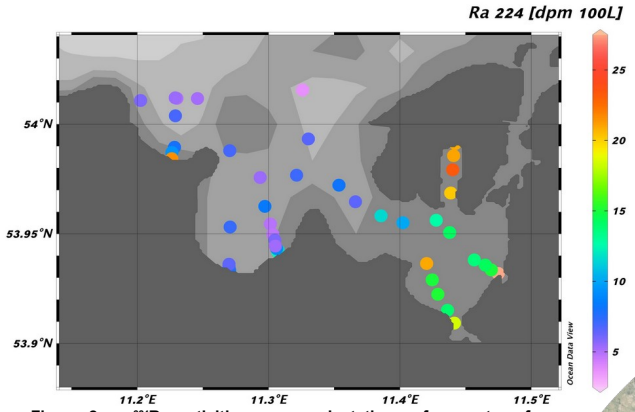

Figure 2 – ^{224}Ra activities measured at the surface water of Wismar Bay

Maximum ^{224}Ra activities were found in the inner part of the bay. Sources of Ra are may streams, diffusion and resuspension from sediments and SGD.

The applied tracers were:

- Major cations
- Nutrients
- Radium isotopes
- Redox sensitive trace elements
- δ^2H and $\delta^{18}O$ of water
- $\delta^{34}S$ and $\delta^{18}O$ of sulphate
- $\delta^{13}C$ of DIC

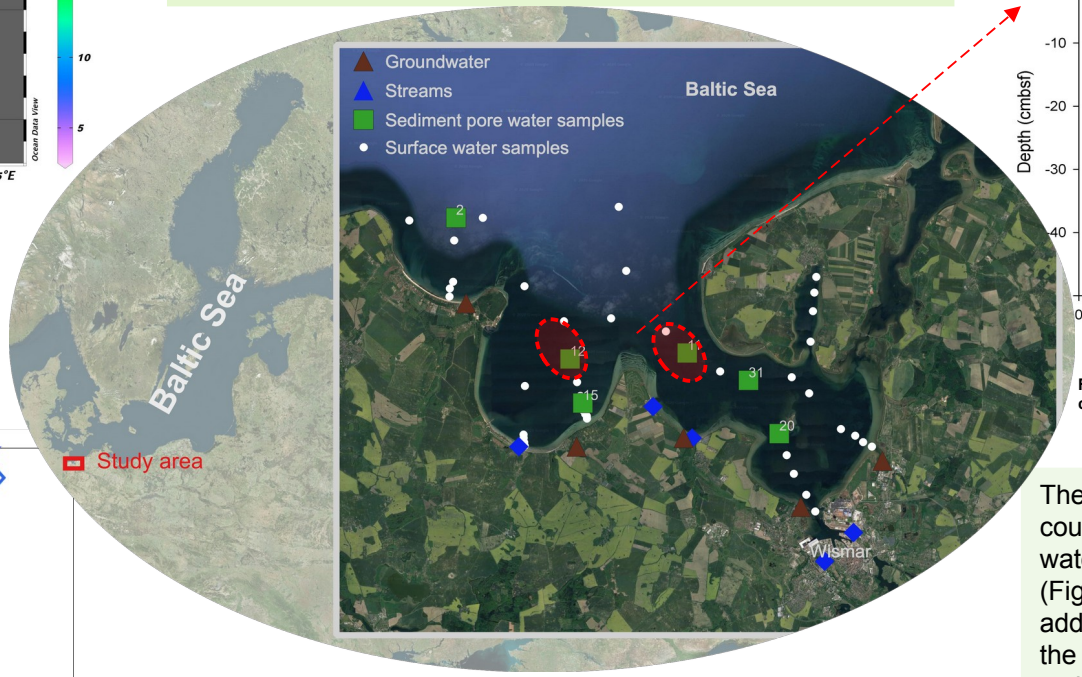

Figure 1 – Map of the study area showing the sample stations. Surface water stations (white dots); sediment pore water samples (green squares); groundwater at the shore line (brown triangles); and streams (blues diamonds). The red marked areas indicate places where freshening was observed at the pore water samples.

Pore water profiles show a decrease on salinity from 12 to 1 at 40 cm depth, red line at the Fig. 4, probably related to a presence of a coastal aquifer

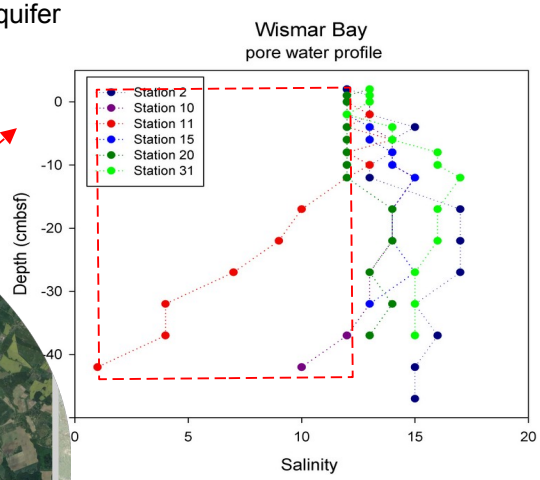

Figure 4 – Sediment pore water profile of salinity of 6 different cores took along the Wismar Bay.

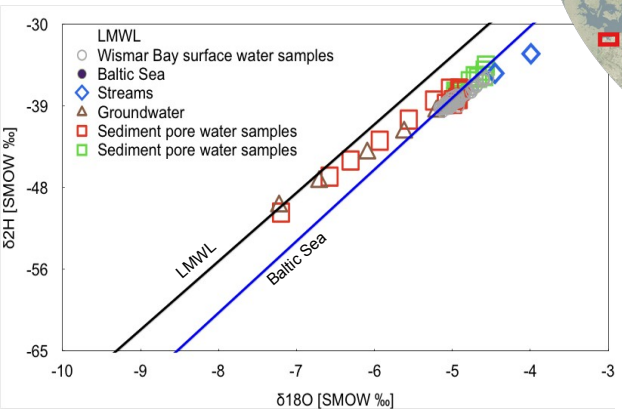

Figure 3 – $\delta^{18}O$ and δ^2H of water. Surface water samples of Wismar Bay (circles); sediment pore water samples (squares); Groundwater at the shore line (triangles); Streams discharging into Wismar Bay (diamond); Baltic Sea Line (blue line), Local Meteoric Water Line established to Warnemuende (black line).

The $\delta^{18}O$ and δ^2H of sediment pore waters plotted close to Baltic Sea line and the surface water of Wismar Bay (green squares Fig. 3), however the pore water where low salinity was observed the composition plotted close to LMWL, which confirms the presence of a coastal aquifer in the central part of the bay

The results indicate a strong benthic-pelagic coupling via pore water exchange with the water column in the inner part of the bay (Fig. 1), suggesting the presence of SGD. In addiction, the pore water profiles highlighted the presence of groundwater about 50 cmbsf.

Our hypothesis is that the advective upward flow of groundwater may increasing the element fluxes across the sediment-bottom interface, and consequently the overall contribution of elements to the coastal ecosystems.

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