

Poland

Cruises

In May 2012 one sampling campaign was performed in order to analyse metals in seawater and groundwater discharged to the Bay of Puck both at Sea and in rivers and groundwater wells (Figure 1) were also analysed.

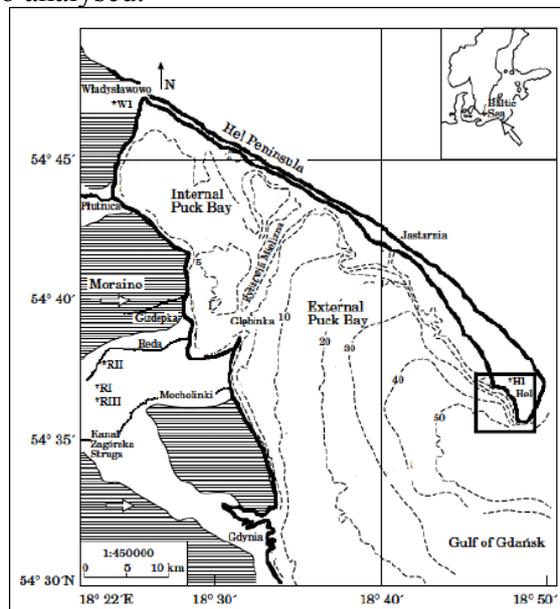


Figure 1. The map of the Bay of Puck with the location of the study area indicated by a square. Gizdepka, Zagórska Struga, Plutnica, Reda are names of the sampled rivers while: RI (Reda I), RII (RedaII), RIII (Reda III), H1 (Hel), W1 (Władysławowo) correspond to the positions of the groundwater wells.

Groundwater lances and seepage meters were used to collect water samples in the study area.

Measurements

Concentrations of dissolved metals (Cu, Co, Cd, Ni, Mn, Pb, Zn, Cr) were determined by ICP-MS method (Elan 9000, Perkin Elmer). Analysis of standard reference material (SLEW 3), and groundwater samples spiked with standard solution (2.5 and $5 \mu\text{g L}^{-1}$ -final volume) served as a quality check. Average recovery of metals were in the range 95-103% (depending on the metal), while the precision given as relative standard deviation (RSD, $n=3$) was smaller than 3.5 % . The obtained metals concentrations of the procedural blank samples never exceeded 5 % of concentrations measured in the actual samples. The analysis for Hg concentration in water were made by CV-AFS method (TEKRAN 2600, Canada), according to US EPA method 1631 (US EPA, 2002). Quality control included the analysis of blanks ($n=5$), and estimating accuracy and precision based on the analysis of water samples ($n=3$) (groundwater, seepage water and seawater) spiked with mercury nitrate to give the final concentrations in the range of 0.5 - 2.5 ng Hg l^{-1} . Adequate precision (6%; given as Relative Standard Deviation - RSD) and recovery (96%) was obtained throughout the study. During each sampling campaign procedural blank samples ($n=5$) were run. The obtained mercury concentrations of the procedural blank samples were lower than the detection limit (0.2 ng Hg L^{-1}) and never exceeded 10 % of concentrations measured in the actual samples.

In addition Mercury and organic mercury fraction were determined in suspended matter collected in years 2011-2012 in western Spitsbergen and Baltic. Results were published in PhD Dissertation of Michał Miotk and presented on scientific conferences.

Conferences

- Szymczycha B, Pempkowiak J, 2012. Nutrients, DIC, DOC and trace metal discharges to the coastal zone via Submarine Groundwater Discharge. The case of the Puck Bay, the Southern Baltic Sea. LAND OCEAN CONNECTIVITY Conference, Brest, France.
- Szymczycha B, 2012. Coastal monitoring strategy, 20th Annual Conference in Lillestrom, Norway.
- Miotk M., Beldowski J., Pempkowiak J. Mercury and Methylmercury in Southern Baltic Sea Sediments, International Conference on Heavy Metals in the Environment, Rome, Italy

Publications

- Szymczycha B, Miotk M, Pempkowiak J, 2013. Submarine Groundwater Discharge as a Source of Mercury in the Bay of Puck, the Southern Baltic Sea. Water, Air and Soil Pollution 224, DOI 10.1007/s11270-013-1542-0.

PhD Thesis

- Submarine Groundwater Discharge (SGD) as a source of nutrients, carbon and heavy metals to the Bay of Puck, off Hel. Beata Szymczycha.
- Bioavailability and methylation potential of mercury in the marine environment: case study of the Baltic Sea and Spitsbergen Fjords.

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