

The Baltic Sea is unique in the global scale. It is very shallow, it has limited access to oceanic waters and stays under strong influence of rivers, which transport variety of pollutants from the whole catchment area. Due to the huge freshwater inflow with rivers, insufficient mixing with oceanic waters, and because of climate conditions in this region, the salinity of Baltic Sea is very low – it values only 7, while the salinity of ocean waters is 35. Therefore Baltic Sea is very specific and some of chemical processes may occur in slightly different way, when comparing it to the oceans. Because of that specificity Baltic Sea is especially susceptible for pollution and it is very important to recognize how big is the contamination of Baltic Sea with arsenic and how the biochemical cycle of arsenic continues in Baltic.

Arsenic is an element widely spread in the environment and occurs in several different forms. Different arsenic compounds have different toxic properties - inorganic arsenic compounds can disturb metabolism on the cellular level, cause ingestion intoxication and are considered to cause cancer, while organic arsenic compounds are thought to be nontoxic. In the environment arsenic occurs naturally as an effect of volcanic processes and rock weathering, however its main source is connected to human activity - mainly fuel combustion, smelting and mining processes, and using arsenic as a component of pesticides. Concentrations of arsenic in seas are elevated comparing to terrestrial environments as arsenic is transported to the sea and bounded in sediments. As a result of microbial processes occurring on the sea bottom, arsenic can be back introduced to the biogeochemical cycle and accumulate in organism. Seafood is the main source of arsenic in human organism, therefore investigating arsenic transformations in marine environment is very important. In the case of Baltic Sea there is an additional source of arsenic - arsenic containing chemical weapon deposited on the sea bottom after the World War II.

So far no research on arsenic speciation in Baltic Sea was performed. The term "speciation" refers to an occurrence of one chemical element in different forms within one studied object. Different forms of that element have usually various physicochemical properties and physiological effects. The aim of proposed study is to recognize the distribution of arsenic in the environment of Baltic Sea. Main goals of this project are defining the forms and estimation of concentrations in which arsenic occurs in different components of southern Baltic Sea – in water, bottom sediments and organisms living in it. Also the results could specify the impact of local bottom processes taking place in sediments and physicochemical parameters of sediments on the behavior of particular arsenic forms.

During the project samples will be collected from board of the research ship “Oceania” owned by the Institute of Oceanology of the Polish Academy of Sciences. Study area is located within the Polish Exclusively Economic Zone – number of sampling points were chosen along the whole polish part of the Baltic Sea coast. Sampling will include water, suspended matter, bottom sediments and benthic organisms. The collected samples will be analyzed in the laboratory for total arsenic concentrations and concentrations of different arsenic compounds. Also additional sediments parameters will be studied (e.g. water contents, grain size, organic matter contents, concentrations of heavy metals which may bound with arsenic and source of the organic matter) to interpret obtained results. Additionally results of analyses of benthic organism could highlight the dependencies between arsenic species concentrations in biota and surrounding sediments.

Do toxic or nontoxic arsenic compounds accumulate in marine sediments and organisms? Are the same forms of arsenic are present in sediments and organisms living in it? And the most important: how high is the arsenic contamination in Baltic Sea? These are some of the questions I would like to answer to by realization of proposed study.