**Biomineralization is a natural process by which living organisms form skeletons composed of biominerals in the company of various organic compounds and chemical elements.** In the marine environment, the most popular biomineral is calcium carbonate, produced by molluscs (bivalves, snails), brachiopods, corals, echinoderms, bryozoans and some groups of algae and protozoa (foraminifera) in the form of protective armour such as shells. Calcium carbonate occurs in two varieties, calcite or aragonite. These are minerals with identical chemical composition, but their different spatial structure causes different physicochemical properties. Calcite is 35% less soluble than aragonite, but the solubility of calcite increases with increasing magnesium content. **Although the process of skeletal formation is primarily biologically and genetically controlled by the organism, environmental factors such as temperature, salinity, or ionic composition of water also to a certain extent control the building process.** On the one hand, it gives the opportunity to use carbonate skeletons as **tools in biomonitoring studies**, because successively produced skeleton layers can act natural archives of the environment in which the organism developed. On the other hand, however, it points to the **negative impact of climate changes on carbonate marine organisms**. Climate changes have bigger and bigger impact on the environment. The temperature increases year by year, while the carbon dioxide absorbed by oceans from the atmosphere causes the acidity of the water, changing the course of many chemical reactions. Disorders of the natural balance of ecosystems can affect both single species and entire ecosystems, leading to damage in the structure of skeletons, and even to the decrease of abundance and biodiversity. But the process of biomineralization is very complex, and the interaction of organism physiology with the environment makes it difficult to describe carbonate skeletons as environmental indicators and predict how organisms will cope in changing habitats.

**Understanding the process of biomineralization in the era of climate changes is one of the top environmental challenges. Therefore, the main objective of the project is to investigate the mineralogical and chemical composition of carbonate skeletons of selected benthic invertebrates inhabiting the Baltic Sea. In addition, the project will attempt to estimate to what extent the environmental factors (temperature, salinity, ionic composition of water) affect the mineralogy and chemical composition of the skeletons.**

The Baltic Sea is a perfect area for proposed research. Seasonal variations in temperature, salinity ranging from about 7 to 28, and inflow of pollutants allow to trace the relationship between the composition of the skeleton and the selected environmental factors. In the collected samples we expect such organisms as bivalves, snails, barnacles, bryozoans and annelid worms. These are organisms with long life cycles, limited mobility, filtering nutrition, large geographical range, and wide tolerance to temperature and salinity changes, what make them an excellent indicators of long-term environmental conditions in different parts of the world.

The description the skeletons together with the environmental factors will be made using X-ray diffraction, inductively coupled plasma mass spectrometry and atomic emission spectroscopy, as well as scanning electron microscopy. We will find out whether the skeleton consists of calcium carbonate in the form of calcite, aragonite or both minerals in different proportions, we will see what is the level of magnesium in calcite and what is the composition of selected chemical elements in the skeleton and sea water. Adding collected data on water temperature, salinity and pH, **we will investigate whether there is a link between environmental factors and skeletal variability.**

New knowledge about marine organisms producing carbonate skeletons will make a significant contribution to global biomineralization studies. **The results will be used to evaluate carbonate skeletons as biomonitoring indicators and to estimate how carbonate organisms are able to exist with the effects of climate changes.** Such information are urgently needed and may have an impact on environmental management. In addition, the results can be used in for example marine sediment studies, interpretation of paleontological data, and even in materials production technologies.