

## **DESCRIPTION FOR THE GENERAL PUBLIC**

Arctic fjords play an important role in the biogeochemical cycle of carbon, nitrogen and phosphorus (C, N and P) - basic biogenic elements. The main source of these elements in sediment is organic matter (OM), originating from the runoff and primary production. A significant part of the deposited OM is permanently stored in the subsurface sediments, which excludes biogenic elements from the current cycle.

Tasks performed in the proposed project will consist in determining the efficiency of carbon, nitrogen and phosphorus burial rate in surface sediments of two fjords (Hornsund and Kongsfjord), located on the west coast of Spitsbergen and differing significantly in terms of hydrology, the intensity of primary production and characteristics of sedimentation regimes. "Burial" is understood as a difference between the amount of carbon, nitrogen and phosphorus settling to the surface sediments and originating from land (river runoff, melting of glaciers and permafrost) and/or marine (dead organisms) sources, and return flux of dissolved forms of these elements from sediments back to water. As part of the proposed research the spatial variability of the organic and inorganic forms of carbon, nitrogen and phosphorus concentrations will be estimated in surface sediments, especially in the context of distance from rivers and glaciers. Moreover, based on the results of samples from sediment cores, it will be estimated how the contribution of terrestrial organic matter has changed over the past decades in the total sedimentary material.

To achieve the goals, 10 cores (about 300 sediment samples) will be collected, five from Kongsfjord and Hornsund, respectively. Most of the analyses will be done in the Marine Biogeochemistry Laboratory at the Institute of Oceanology of the Polish Academy of Science, in Sopot.

Within the proposed project the burial rates of carbon, nitrogen and phosphorus in surface sediments of two different (mostly in terms of the hydrology) fjords of the West Spitsbergen (Hornsund and Kongsfjord) will be determined. This will allow to assess the impact of global warming on the organic matter burial in the "cold" fjords. Organic and inorganic forms of C, N and P will be quantified in sediments, which is often ignored in contemporary research. Moreover, the origin of OM in sediments will be identified. The results will allow to assess the magnitude of the return flux of C, N and P from sediments to overlaying water, and thus also to estimate how intensively the mineralization of OM is taking place in surface sediments. Quantification of the return flux of N and P from sediments is important also in the context of mechanisms influencing biological activity in the water, because both these elements can limit phytoplankton activity. The results obtained in the proposed study can also have a broad applicability in numerical biogeochemical models used in the Arctic shelf.