

Ocean currents are extremely important for the climate on our planet. Warm currents heat the air and supply it with humidity, increasing the precipitation over the surrounding lands. Cold currents act in an opposite way – they cool and dry the overlying air masses. Examples of such relationships can be found all over the world.

The Nordic Seas constitute the main connection between the Atlantic and Arctic oceans. A huge whirlpool, called the Greenland Gyre, forms here. Warm waters coming from the south mix here with cold waters coming from the north. The intensity of the cold and warm waters inflow, as well as the activity of the gyre, changes in time which has a huge impact on climate not only in the region but on the entire planet.

In our research we want to reconstruct how the intensity of the water masses inflow into the Nordic Seas and the activity of the Greenland Gyre changed over the last 11.7 thousand years, i.e., during the last interglacial – the Holocene. We especially want to find out what was the relationship between these two phenomena. Was the increased inflow related with strengthening and expansion of the gyre or its weakening? Which of them was the cause and which was the result? How did the changes influence the marine environment and the climate in the region?

To answer these questions we plan to analyze a series of marine sediment cores taken from across the Nordic Seas. In the cores we want to study the carbon content of shells of foraminifera, unicellular marine organisms, to find out how it changed over time. It will allow us to estimate how much atmospheric carbon was permanently stored in marine sediments. This in turn will provide us with information on changes in marine environment and its influence on climate. The results will be supplemented by other proxy data from the cores to gain a possibly complete image of environmental changes in the past.

The time period selected for the study – the Holocene – is particularly important in the history of the Earth not only because it almost completely covers the development of our civilization. It also contains numerous climate warming episodes. The knowledge of the mechanisms governing these events and the relationships between oceans and the climate will improve our understanding of modern changes affecting our planet and our predictions about its future. This is of great importance for the security and development of our society and the generations to come.