ICARIS:

Impact of **ca**lcite ove**r**growth on **i**n foraminifera from Nordic **S**eas sediments.

Paleoceanographic studies focus on reconstructing past climates on Earth using sediments stored at the bottom of the oceans. Over the years, numerous tools for these reconstructions have been discovered, and one of them are foraminifera. These tiny, marine organisms build very durable shells that are stored in the sediments of the oceans for thousands, and even millions of years. By collecting sediment cores, we can reconstruct various environmental factors such as temperature, salinity or water level by analyzing the composition of foraminifera shells. In fact, most of the prehistoric temperature reconstructions come from foraminifera. This is because they are very common in different marine environments and also relatively easy to find and study.

A recent discovery in the Arctic Ocean basin revealed that certain environmental reconstructions based on foraminifera may contain errors. They happen because of authigenic calcite presence. While foraminifera typically construct calcite shells, it has been observed that, in some cases, authigenic calcite develops on these shells long after the organisms' death (Fig. 1). Since this authigenic calcite has a different chemical composition, it causes foraminifera shells to be a less reliable tool to reconstruct past environmental conditions.

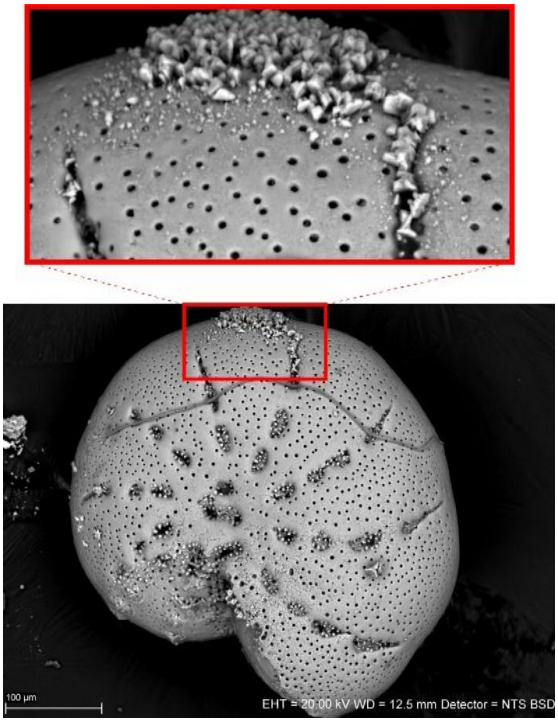

Figure 1. Foraminifera shell affected by authigenic calcite overgrowth, sampling site: Hornsund fjord, Spitsbergen Island (2019).

We plan to determine if and how foraminifera shells are affected by authigenic calcite overgrowth. The region we picked for the study is the Nordic Seas. Here, the sediments are composed of fine muds that preserve foraminifera well. Leveraging Scanning Electron Microscope (SEM) technology, we can will study foraminfiera shells and determine the presence of authigenic calcite. Additionally, individuals with authigenic calcite overgrowths and those unaffected by it will undergo a series of chemical analyses to examine how they differ in terms of elemental composition and stable isotope ratios.

Our laboratorys extensive archive contains foraminifera specimens from Nordic Seas, originating from crucial climatic events such as the Last Glacial Maximum, Younger Dryas, Roman Warm Period, and Little Ice Age. Younger Dryas, known for beeing an abrupt cooling event, influenced human culture by prompting a shift from hunter-gathering to farming. Our project aims to provide a comprehensive assessment of errors in reconstructions of such climatic events. Additionally, thanks to this project, a better assessment of future climatic shifts in the Arctic and continental Europe will be possible.