

Antarctica is the most isolated continent, with difficult polar conditions. The epicontinental seas surrounding this continent are inhabited by relatively diverse groups of organisms, including many endemic forms living on the seabed, which survived even more extreme conditions of the Last Glacial Maximum approximately 20,000 years ago. At that time, the Antarctic ice sheet expanded much more to the north than today, occupying almost all of these seas and dislocating living organisms into so-called glacial refugia, small areas located at the edge of the continental shelf, in deeper areas of the ocean, and perhaps also around subantarctic islands off the Antarctic continental shelf.

One of the largest of such sanctuaries on the Antarctic continental shelf was located in the northwestern part of the Ross Sea, where, at the northern reaches of the JOIDES and Pennell submarine troughs, two bays with an ice-free seabed existed, probably covered by an ice shelf, under which restricted groups of organisms persisted, similar as in today's southern part of the Ross Sea or under the Amery Ice Shelf in eastern Antarctica. Although scientists have identified where these and similar refugia may have existed, there is no knowledge yet about environmental conditions, living communities, and the processes occurring in these refugia during the Last Glacial Maximum and at the beginning of the last interglacial period. The proposed study aims to fill this gap.

In early 2024, two cores were collected from the central parts of the bays in question. These cores were opened and initially described immediately after being brought aboard icebreaker *Nathaniel B. Palmer*. Both contain greenish sediments of the open sea, separated by gray sediments deposited under the ice shelf, probably during the Last Glacial Maximum. The thickness and development of both types of sediments are drastically different between the two sites, suggesting clearly different conditions in both basins. Already at the current stage of research, it seems that in the case of JOIDES, conditions were clearly more open-marine than in the case of Pennell, where the influence of the open sea during the Last Glacial Maximum seems to be fairly limited.

The sediments from the cores will be examined in detail in terms of their chemical composition and composition of organic matter, microfossils (diatoms and foraminifera), and, above all, DNA of organisms inhabiting the seafloor at the times the sediment was formed. This will allow us to reconstruct former conditions: temperature, the presence of sea ice, the presence of an ice shelf, and perhaps also the mechanisms behind the observed changes. It will also be possible to describe the communities of marine organisms present in the studied area during and after the last ice age, as well as to trace the process of reestablishing of diverse communities of organisms typical of the open sea, especially those inhabiting the seafloor, after the retreat of the ice shelves.

The research will be conducted by an international team consisting of renowned researchers with large experience in polar research led by Wojciech Majewski from the Institute of Paleobiology of the Polish Academy of Sciences in Warsaw.