

Climate Change, European Polar Research, Research Icebreaker

Polar research and in particular the properties of northern and southern high latitude oceans are currently a subject of intense scientific debate and investigations, because they are (in real time) and have been (over historic and geologic time scales) subject to rapid and dramatic climatic variations. Polar regions react more rapidly and intensively to global change than other regions of the earth. News about shrinking of the Arctic sea-ice cover, potentially leading to an opening of sea passages to the north of North America and Eurasia, on the long to a “blue” Arctic Ocean, as well as about the calving of giant table icebergs from the ice shelves of Antarctica are examples for these modern changes.

Until now it is not clear, how many of these profound shifts in all parts of the Arctic are natural fluctuations or are due to human activity. Since this is a phenomenon of decades, long time data series of atmospheric and oceanic conditions are needed for its understanding and prediction of its further development.

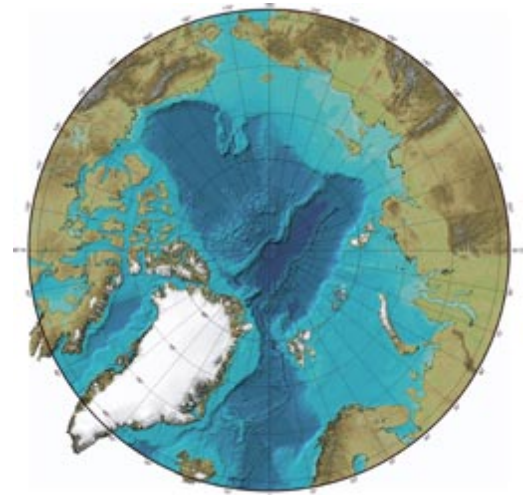
Despite the strong seasonality of polar environmental conditions, research in the central Arctic Ocean up to now could essentially only be conducted during the summer months, when the Arctic Ocean is accessible to the currently available research icebreakers.

In spite of the critical role of the Arctic Ocean in climate evolution, it is the only basin of the world's oceans that has essentially not been sampled by the drill ships of the [Deep-Sea Drilling Project \(DSDP\)](#) or the [Ocean Drilling Program \(ODP\)](#) and its long-term environmental history and tectonic structure is therefore poorly known. Exceptions are the ODP Leg 151 and the more recent very successful [ACEX-expedition](#) of the [Integrated Ocean Drilling Program \(IODP\)](#). This lack of data represents one of the largest gaps of information in modern Earth Science. Therefore, the new research icebreaker AURORA BOREALIS should be equipped with drilling facilities to fulfill the needs of the IODP for a “Mission Specific Platform” to drill in deep, permanently ice-covered ocean basins. The icebreaker must also be powerful enough to keep station against the drifting sea-ice cover and will have to be equipped with dynamic positioning.

The AURORA BOREALIS project focus on two scientific communities, which in part overlap and in part have divergent interests.

1. The first one is the general polar science community, which requires a ship to carry out its field and marine work and has a wide spectrum of scientific perspectives.
2. The second is the deep-sea drilling community that would use the ship mainly during the summer months with optimal ice condition to study the structure and properties of the oceanic crust and the history of the oceanic depositional environments that can be deduced from the sediment cover.

The scientific objectives of the AURORA BOREALIS project are outlined in the [“Science Perspective”](#) (Thiede & Egerton, 2004), published by the [European Polar Board \(EPB\)](#) of the [European Science Foundation \(ESF\)](#) in collaboration with [ECORD \(European Consortium of Ocean Research Drilling\)](#).



Bathymetric map of the Arctic Ocean
Graphic: IBCAO

- Read more about the project structure specially about the [WP2: Integration and Science Management](#)