

CLIMATE-RELEVANT DATA

AURORA BOREALIS is technically unique. It is designed as a combination of a heavy icebreaker, a deep-sea drilling ship and a multi-purpose research vessel to obtain climate-relevant data. The operational areas comprises the Polar Regions during all seasons as well as the open oceans.

To date, no comparable vessel for **single-ship, year-round polar expeditions** is available worldwide, neither in commercial shipping and the offshore industry, nor for scientific operations. The naval architects and engineers thus succeeded in developing the world's **most advanced icebreaker** with the ability to perform **scientific deep-sea drilling** even within closed sea-ice cover.

PARTNERS AND SUPPORT



ESF European Science Foundation
AWI Alfred-Wegener-Institut für Polar- und Meeresforschung in der Helmholtz Gemeinschaft, Germany
CNR Consiglio Nazionale delle Ricerche, Italy
PNRA Programma Nazionale di Ricerche in Antartide, Italy
CNRS-INSU Centre National de la Recherche Scientifique - Institut National des sciences L'Univers, France
AARI Arctic and Antarctic Research Institute, Russia
IPEV Institut Polaire Français Paul Emile Victor, France
NWO Netherlands Organisation for Scientific Research, Netherlands
UIB University of Bergen, Norway
BMBF Federal Ministry of Education and Research, Germany
BAI Bulgarian Antarctic Institute, Bulgaria
FAR Fundatia Antarctica Romana, Romania
AARC Aker Arctic Technology Inc., Finland
BELSPO Belgian Federal Public Planning Service Science Policy, Belgium
GEUS Geological Survey of Denmark and Greenland
FMI Finnish Meteorological Institute, Finland
SYKE Finnish Environment Institute, Finland
MUMM/RBINS Management Unit of the Mathematical Model of the North Sea/ Royal Belgian Institute of Natural Sciences, Netherlands



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AURORA BOREALIS
 EUROPEAN RESEARCH ICEBREAKER CONSORTIUM

TECHNICAL DETAILS

- **Icebreaker**, Polar Class 1, diesel-electric, with 81 MW propulsion power
- **Deep-sea drilling** in closed sea-ice cover with more than 2 m thickness
Rig specification: drilling in more than 5000 m water depth with 1000 m penetration. Riserless drilling technology
- **Dynamic positioning** system for **on-station drilling** within **closed sea-ice cover** and open water
- **Two moon pools, 7 x 7 m each**, one for deep-sea drilling, one for deploying other scientific underwater equipment (ROV, AUV, etc.)
- **Operation temperature**: fully functional down to **-50°C**, **working capacity +45°C** to **-30°C**
- Complete twin hull design and full redundancy in ship's safety systems
- Advanced ice-forecasting and management with autonomous, multiple helicopter support
- Modularized mobile laboratory systems for mission specific laboratories

Length overall: 199.85 m | Moulded breadth: 49.00 m | Max. draught: 13 m
 Max. speed in open water: 15.5 kn | Cruising speed in open water: 12 kn
 Scientists and crews: 120 persons | Max. period of operation: 90 days

The AURORA BOREALIS project is supported by:



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**3 IN 1 –
 ICEBREAKER,
 DRILLING PLATFORM
 AND RESEARCH VESSEL**

WWW.ERI-AURORA-BOREALIS.EU



THE PROJECT

The AURORA BOREALIS project focuses on two scientific communities: The first one is the general **polar and marine science** community, which requires a research vessel for conducting field and marine work throughout all seasons of the year.

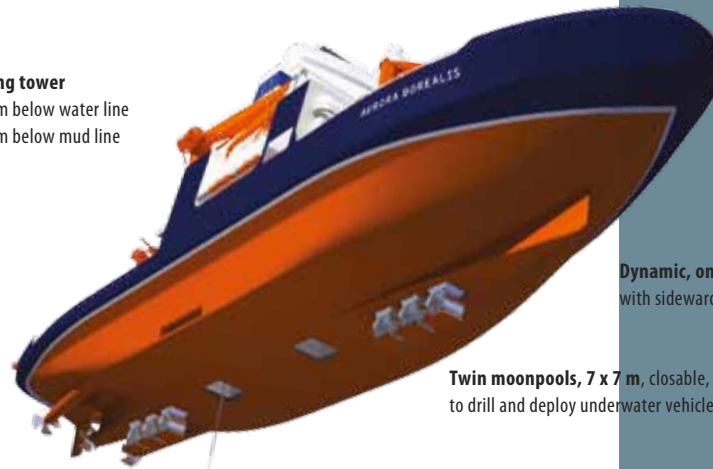
Second, the **deep-sea drilling science** community would use the ship mainly during summer months with optimal ice conditions to yield new climate-relevant data.

Polar sciences today lack the critical ability to carry out **year-round** research, monitor and perform experiments in the central Arctic Ocean. Up to now, weather and ice conditions prevent autonomous, **single-ship expeditions** of research vessels into this pack ice-covered realm during harsh winter seasons – when the most critical climatic, biological and oceanographic processes occur.

A state-of-the-art research vessel like AURORA BOREALIS will be a unique platform to accomplish new scientific results. It features:

- **Maximum ice-breaking** capability
- **Dynamic positioning** for on-station drilling in closed sea-ice cover
- **Two moonpools, 7 x 7 m**, one for drilling and one to safely deploy underwater vehicles for sub-ice surveys
- **Advanced ice-forecasting** and management
- **Autonomous, multiple helicopter support**
- **Modularized mission-specific laboratory systems**

Drilling tower
5000 m below water line
1000 m below mud line



Dynamic, on-station positioning
with sideward, retractable thrusters

Twin moonpools, 7 x 7 m, closable,
to drill and deploy underwater vehicles



Opening the archives of Earth's climate

Although the Arctic Oceans play a critical role in climate evolution, it is the only basin of the world's oceans that has not or only marginally been sampled by the Deep-Sea Drilling Project (DSDP) or the Ocean Drilling Program (ODP).

The considerable technical and logistical efforts that are necessary to operate in the harsh $-50\text{ }^{\circ}\text{C}$ conditions have so far prevented the retrieval of natural paleoenvironmental archives, i.e. sediment cores from the deep seafloor. Now, a new type of polar research icebreaker-drilling ship has been projected to enable a plethora of long-awaited research results.

In a longterm perspective the AURORA BOREALIS will also be used to address research targets around Antarctica, both in its mode as a regular multi-purpose research vessel as well as a polar drilling ship.

SCIENTIFIC RELEVANCE

Why Polar research?

Polar regions react more rapidly and intensively to global change than any other region 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 and about the calving of giant table icebergs from the ice shelves of Antarctica are examples of these recent changes.

Europe has a particular interest in understanding the Arctic environment and its potential for change because many of its highly industrialized nations reach into high northern latitudes and because Europe is under the steady influence of, and in exchange with, the Arctic environment. In addition, considerable living and non-living resources are found in the Arctic Ocean.

Research in the Polar oceans can only be carried out by sophisticated ships. AURORA BOREALIS, scheduled as a multi-disciplinary research icebreaker, is based on the knowhow of well-established precursor vessels. Still, it surpasses them with its combined winter ice-going and drilling facilities.

Timelines

Preparatory phase: 2008–2012
Construction phase: 2012–2016
Operation: 2016 onwards

