

Arctic Research Icebreaker Consortium (ARICE) and its oceanographic data management

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About the ARICE project.

The recent changes of the Arctic and the resulting increased economic activity in the region have triggered a societal demand for accurate sea-ice and weather predictions, information on the status of the Arctic Ocean and its marine life, and complex predictions of future scenarios. To address these issues of particular environmental and societal concern and to develop policy recommendations for a sustainable usage of the Arctic Ocean and its resources, the international Arctic science community must have access to world-class research icebreakers to access the ice-covered Arctic Ocean. The lack of availability of icebreakers in Europe and beyond and a not optimally coordinated polar research fleet and polar programmes impedes Europe's capacity to investigate this region. There is thus an urgent need for providing European researchers with better research icebreaker capacities for the Arctic. ARICE aims at reaching this goal with the existing polar fleet by:

1) Networking:

ARICE will develop strategies to ensure the optimal use of the existing polar research vessels at a European and international level, working towards an International Arctic Research Icebreaker Consortium which shares and jointly funds operational ship time on the available research icebreakers.

2) Transnational access:

ARICE will provide transnational access to a set of six key European and international research icebreakers for European scientists, based on scientific excellence of submitted proposals:

- PRV Polarstern, Germany
- IB Oden, Sweden
- RV Kronprins Haakon, Norway (under construction, to be operative in 2017)
- RRS Sir David Attenborough, United Kingdom (under construction, to be operative in 2018)
- CCGS Amundsen, Canada
- RV Sikuliaq, United States of America

3) Joint research activities:

ARICE will improve the research icebreakers' services by partnering with maritime industry on a "ships and platforms of opportunity" programme and by exploring into new key technologies that could lead to an improvement of ship-based and autonomous measurements in the Arctic Ocean. ARICE will also implement virtual and remote access of data via an innovative 3D Virtual Icebreaker.

Data management in ARICE.

ARICE will generate a variety of data sets which can be sub-divide into three categories :

1) Oceanographic observations : bathymetry, water temperature, salinity, currents, sea state (wave height), ocean surface heat flux, ocean colour, pH, nutrients, carbon (inorganic or organic), oxygen or

nitrous oxide (N₂O), primary production / chlorophyll, fish abundance, marine mammals and polar bears ;

2) Atmospheric parameters : air temperature, wind speed and direction, air pressure, water vapor or humidity, precipitation, cloud fraction, cloud base height, CO₂, methane or other greenhouse gases, ozone or aerosols, radiation budget ;

3) Sea ice / snow parameters : sea ice thickness, sea ice concentration, sea ice extent/sea ice edge, sea ice drift, ice load (on the hull), floe size, ice ridge density, compression in the ice pack, snow/ice surface topography, snow thickness, albedo and melt ponds (fraction or appearance) ;

ARICE aims at its research data to be findable, accessible, interoperable and reusable (FAIR).

Data management in ARICE will be coordinated with relevant Arctic and oceanographic data management systems and adopts the Arctic Data Committee standards. The Arctic Data Committee can be visited at <https://arcticdc.org/>.

All data generated under ARICE funding will be accessible to the user group who collected the data. The Principal Investigator of an ARICE cruise must submit the data generated together with sufficient metadata to the respective IODE National Oceanographic Data Centre (NODCs) directly after the cruise. The NODC will then make sure that the data sets are quality controlled, archived in the NODCs and linked to the metadata of the respective cruise. All Datasets will also be integrated into the ARICE Data Management System, the ARICE project's database and disseminated in an interoperable open format through the 3D Icebreaker outreach tool. Access to the datasets, apart from metadata, can be restricted to the scientific party and its designated partners for a period of 1 to 3 years after the cruise takes place (depending on specific RV procedures). Requests of external users for data access during this time will be forwarded to the data originators for their decision.

ARICE is a part of the H2020 Open Research Data Pilot which aims at improving and maximising the access to and re-use of research data generated projects.