BACKGROUNDER

This $27.7 million international infrastructure project provides Canadians with a national state-of-the-art research platform to study the Arctic. Over the next 10 years, the research will support several major multidisciplinary programs to advance the understanding of climate and climate change, oceanic circulation, sea-ice dynamics, biology, biochemistry, sedimentology, paleoceanography, and geology in the Canadian sector of the Arctic Ocean.

People in northern communities—such as the Inuit and Inuvialuit—feel, first hand, the impacts of arctic climate change. Direct involvement of the northern communities in the research will maximize the two-way transfer of knowledge in the planning of strategies of mitigation and adaptation to climate change.

The retrofit and the state-of-the-art scientific equipment will make the icebreaker one of the most advanced research platforms of its kind. Several instruments used in upcoming scientific missions will be deployed for the first time in the Arctic Ocean.

In addition to providing an Arctic research facility to Canadian researchers and graduate students, the icebreaker will attract scientists from a number of world-class research institutes, including:

- the Scott Polar Research Institute, at the University of Cambridge (UK);
- the Woods Hole Oceanographic Institute, the National Institute of Polar Research (Japan);
- the US Geological Survey.

The funds are awarded to a consortium of 15 Canadian universities with its administrative centre located at Université Laval:

- University of British Columbia
- University of Calgary
- University of Saskatchewan
- University of Manitoba
- Guelph University
- University of Ottawa
- Queen's University
- Université du Québec - INRS
- Université du Québec à Montréal
- Université du Québec à Rimouski
- Université du Québec à Trois-Rivière
- Université Laval
- McGill University
- Dalhousie University
- Memorial University of Newfoundland

The CFI funds are awarded under its International Joint Ventures Fund, which supports the establishment of a small number of very high profile research infrastructure projects in Canada to take advantage of extraordinary research opportunities with leading facilities in other countries that will bring significant benefits to Canada.

University of British Columbia

Researchers at UBC will undertake various land- and water-based projects from aboard the icebreaker. These will include studies of the effects of climate change on Arctic tundra plants and soils, as well as on the communities and people of the Arctic Ocean coastal regions, and a look at the effect of viruses and bacteria in the Arctic Ocean on global carbon cycling.

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University of Calgary

Researchers at the University of Calgary will examine the role and timing of seasonal growth and decay processes that land-fast sea ice experiences and their effect on biological systems operating at the margins of the Bathurst Polynya. They will conduct a sea ice-based field experiment adjacent to the ship in the winter. A second sea ice camp will be established near Tuktoyaktuk, NWT in spring to measure and monitor the seasonal relationship between sea ice and biological processes resulting from the fresh water influx from the McKenzie River.

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University of Saskatchewan

Research at the University of Saskatchewan will focus on physical and biological processes that influence the structure of animal communities inhabiting the sea floor and the cycling of carbon through these communities. Annual variations in sea ice cover and thickness affect both the species composition and diet of bottom-dwelling communities, factors which in turn influence the rate at which carbon is cycled. This study will contribute to our understanding of how carbon is partitioned among ocean waters, bottom-dwelling animal communities and the sea floor.

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University of Manitoba

It is becoming increasingly evident that the ocean-sea ice-atmosphere (OSA) interface is susceptible to climate change and is a contributing factor in the observed global variability in the Earth-Atmosphere system. At the University of Manitoba, internationally recognized sea ice expert David Barber is working with a team to improve knowledge of the physical and biological processes operating within the OSA system and to develop tools that will allow predictions of changes within this system both in space and time.

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University of Guelph

University of Guelph zoology professor Paul Hebert's research in the Arctic examines how molecular studies can provide new insights into the diversity of life. Currently, he is working on the development of biological identification based on DNA barcodes. His past work has contributed novel insights into the breeding systems of polar life and the routes that these organisms employed in recolonizing the north after the glacial retreat that took place some 10,000 years ago. He has also been very active in developing Web-based educational resources on northern life and environments (www.arctic.uoguelph.ca).

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University of Ottawa

The work of researchers in the Laboratory of climatology and paleoclimatology deals with climate change in the Canadian Arctic and its impacts on terrestrial and freshwater ecosystems. Studies have documented climatic variability during the past 10,000 years and demonstrated impacts of human-caused climate changes on arctic systems during the past 100 years.

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Queen's University

Researchers at Queen's University are using lake sediment records to reconstruct long-term variability in environmental conditions in the Canadian Arctic. Their work has generated the first indications of how the Arctic ecological and hydroclimatic environment has changed during the past several millennia. This work provides fundamental information for assessing recent and predicted climate variability in this sensitive environment.

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Institut national de la recherche scientifique (INRS)

With their expertise in marine ecotoxicology, marine hydrodynamics, biooptics and geochemistry, researchers from the Institut national de la recherche scientifique (INRS) are shedding new light on the effects of climate change on issues ranging from the future of polynyas to the aquatic food chain. In addition to studying oceanic carbon flows, they will examine the movement of contaminants and their effects on the immune systems of marine species as well as their possible consequences on human health.

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UQÀM (Université du Québec à Montréal)

Professor David Bird, a member of Groupe de recherche interuniversitaire en limnologie et en environnement aquatique (GRIL), will study the impact of climate change on the ecology of Arctic islands, specifically the biogeochemistry of fresh water environments such as lakes and swamps. The hydrology of these environments is very sensitive to variations in annual precipitation cycles. It is expected that the Arctic will experience the most pronounced temperature changes in the world, together with a greater concentration of deposited pollution and a lesser amount of biomass to absorb this pollution. Water levels affect the very fragile characteristics of tundra and have a measurable impact on the food chain, from micro-organisms to bears, musk-ox and caribou, in addition to fish and migratory birds. The local Inuit population will also draw benefits from better knowledge of these ecosystems.

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Professor Juniper, President, Canadian Scientific Submersible Facility, will study the effects of climate change and fishing activities on arctic ecosystems. He will be using a remote-controlled submersible that will be permanently installed aboard the ice-breaker and will be capable of diving in Arctic waters down to a depth of 1500 m. These investigations will yield a better understanding of the damage inflicted on deep-water coral and other biodiversity oases by increasing fishing and dredging activities in the Arctic. They will also further a better understanding of the formation of new ecosystems that interact with natural seepage of oil and natural gas. Kim Juniper is well known, among other things, for his research on mineralization processes and biological activities that surround submarine hydrothermal vents.

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Université Laval

Director general of Québec-Océan, scientific leader of the NOW (International North Water Polynya Study) and CASES (Canadian Arctic Shelf Exchange Study) Research Network and Project Leader of the Research Icebreaker Project, Louis Fortier is a tireless promoter of a multidisciplinary approach to the study of the ecosystem-level questions raised by the warming of the Arctic.

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Memorial University of Newfoundland

The work of researchers at Memorial deals with the role of zooplankton in the carbon and nitrogen cycles of polynyas, which are areas of open water in the midst of ice-covered seas. This study is showing that zooplankton are important in the sequestration of the greenhouse gas, carbon dioxide, by polynyas, and thus it is helping to put together a picture of the role of polynyas in global climate change.

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