

New cyberinfrastructure opens doors to Arctic data warehoused across the country

CFI supports project led by Arctic researcher Maribeth Murray to facilitate information sharing among scholars, Inuit, and others

1

By Andrea Kingwell, for the Office of the Vice-President (Research)

March 8, 2019



The Canadian Consortium for Arctic Data Interoperability (CCADI)'s Arctic research data infrastructure project has recently earned support from the Canada Foundation for Innovation. Photo by Matthew Ayres

There is a treasure trove of invaluable Arctic data and Inuit Knowledge in Canada which has been painstakingly collected over decades. However, much of this information is difficult to access and use because of the distributed nature of data archives, different data formats and technologies, and the sheer volume and variety of information.

The task of unlocking access to that data has fallen to Dr. Maribeth Murray, PhD, director of the Arctic Institute of North America, and the multi-institutional team of scientists and Inuit partners she's co-ordinating through the [Canadian Consortium for Arctic Data Interoperability](#) (CCADI). The Arctic research data infrastructure project they have developed has recently earned support from the [Canada Foundation for Innovation](#).

"Arctic data and information is located in many different repositories around Canada, from universities, to government agencies and Inuit organizations. Much of this is disconnected, and difficult to locate, access and use," says Murray, who is the project lead for the CCADI.

"We're building interoperability across our different institutional platforms using common standards and guidelines, developing new data visualization and analysis tools, and protocols for ethical access to and use of Inuit Knowledge. The goal is to improve data discovery and mobilization of data across a wide spectrum of research, Inuit, government and other end users to advance Arctic science and evidence-based decision making."

"We are proud of the University of Calgary's role as a leader in this important national, multi-institutional Arctic research initiative," says Dr. André Buret, interim vice-president (research). "This project is complex, and its scope and scale will require a high level of technological and scientific sophistication, and we are very pleased it has been recognized and supported by the CFI."

Funding was also awarded to Dr. Eric Donovan, PhD, professor in the Faculty of Science, for the project AuroraX, an initiative to build enhanced data tools and a data platform for auroral science.

Taking a bite-sized approach to a daunting task

Murray readily acknowledges that the goal to build a national network of linked, interoperable data centres with common standards is daunting. The development of the Arctic Research Data Infrastructure (ARDI) encompasses a potentially massive quantity and variety of data from satellite imagery to Inuit Knowledge of sea ice to ocean chemistry, to cite just a few examples.

The initial approach will be to focus on several use cases that advances the understanding of the Arctic as an interconnected system while also providing needed data to inform and support evidence-based decision making by Inuit organizations, as well as territorial and federal departments. The use cases will demonstrate how research can be accelerated through interoperable data systems.

"We selected uses cases that resonate broadly with both the academic research community and with Inuit-organization research and management objectives," Murray says.

Incorporating Inuit objectives around data and information

One important aspect of the project is its support from the Inuvialuit Regional Corporation and the Inuit Tapiriit Kanatami which are full partners in the CCAD and which will work with the other Inuit land claims regions and governments to share project results.

"This project directly involves Inuit organizations in the design and development of critical platform technology that will improve their access to relevant, timely, high-quality data inclusive of Inuit Knowledge," Murray says. "Access to this fundamental data is critical to creating social and economic equity for Inuit; the new data infrastructure platform will break down longstanding information-access barriers while simultaneously ensuring protection of sensitive Inuit Knowledge and Inuit data."

Barriers to interoperability

The scale and the complexity of the problem has long been recognized. The barriers to information sharing are myriad: people collect data in different ways, record it differently, and use different kinds of software to manage it. Formatting and semantics can be problematic, as even within the scientific community, terminology and standards for recording the same phenomenon may differ across disciplines.

"Our job is to try to address this variability and continue to work towards use of common protocols and standards so that information is more easily discoverable, data more easily accessed and analyzed and hence broadly usable," Murray says. "The data and information also need to be accessible in a fashion that is appropriate and desired by Inuit, including ethical and legal frameworks that structure access to sensitive information and Inuit Knowledge."

Once the ARDI is established, users will enter through a single portal, find whatever datasets exist on a subject they are interested in — whether they originate in at the Arctic Institute at the University of Calgary, the Centre d'Etudes Nordiques at the University of Laval, the Polar Data Catalogue at the University of Waterloo, the Inuvialuit Regional Corporation, or elsewhere among the data centres managed by the CCADI partners — and then pull that information together to analyze using new tools developed as part of this initiative.

However, the project will go far beyond data discovery and interoperability by providing users with a 'virtual research platform': a collaborative environment in the cloud that brings together data, computing power, storage, and analysis tools. The ARDI will provide a working environment where users can bring their algorithms and applications to the data, avoiding the need to download and store large volumes of data locally. It will also act as an online collaboration hub, where users can exchange ideas, co-develop algorithms, and work together across the globe to develop and improve information extraction methods.

"At this scale, outside of interoperability initiatives co-ordinated by entities such as the World Meteorological Organization and the European Space Agency, this is unprecedented," Murray says. Arctic data sharing is a priority agreed upon by many countries at last year's Arctic Science Ministerial in Berlin.

"If we are successful in creating this national Arctic Research Data Infrastructure, we will not only bring significant value added to research outputs in Canada, we will be international leaders demonstrating how this can be accomplished elsewhere. This is a critical step for research, for Inuit, and for our ability to address rapid Arctic change in a responsible and informed manner."

Find more information on the CCADI [here](#).



Maribeth Murray, director of the Arctic Institute of North America and professor in the Faculty of Arts. Photo courtesy Maribeth Murray

UToday

Follow UToday on [Twitter](#) or via [RSS Feed](#).

Check the [UToday website](#) for news about events, people and trends at University of Calgary.

Follow what's happening on campus using our interactive [events calendar](#).