

Uncovering the potential for geoscience research in Canada's North

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David Mate, Executive Director of the Northern Canada Division, Geological Survey of Canada, shares how the GEM-GeoNorth program is using geoscience research to improve the quality of life for Canadians

We have a longstanding geological knowledge gap in Canada. The north – the area above 57° latitude – encompasses roughly 40 per cent of the total area of Canada. Despite the importance of this region to the culture, history and identity of our country and its people, it has historically been understudied compared to southern Canada. We have much to understand about geoscience research in this environment, and resource potential, as well as the resilience of the land and infrastructure to climate change.

New and modern geological interpretations of the land and its natural resource potential will support the growth and sustainability of northern communities, governments, and businesses – that is the goal of GEM-GeoNorth, the Geological Survey of Canada's northern geoscience mapping program that is managed by Natural Resources Canada (NRCan).

The land beneath our feet tells a story in geoscience research

Throughout time, that land may have shifted and eroded; it could have broken apart, been frozen and covered by glacier ice, undergone different pressures and temperatures, injected with hot fluids, or taken on different chemical properties. Each landscape has a unique history, where rocks and landforms give us clues about what happened in the past. Interpreting the geological framework – the story – of a region is paramount. By studying the history of the land, we are gaining the knowledge we need to better prepare Canadians for the future.

Beginning in 2008, the Geo-Mapping for Energy and Minerals Program has evolved over the years. We mapped areas of Canada's North that had never had modern mapping coverage. In the second phase, from 2013-2020, we applied state-of-the-art geological science and technologies to document geological structures, create the first digital geological maps of the region and further develop geological models and regional frameworks. We also added Indigenous Engagement to the mandate to improve program delivery and development and relevance to northern and Indigenous communities. GEM-2 published over 2000 knowledge publications, created 400 maps, administered 50 grants, and hosted 400 community engagement activities.

People bond with people, not institutions. This has been the key to building relationships with the Inuvialuit Regional Corporation (IRC), and all six Inuvialuit communities in the Inuvialuit Settlement Region (ISR).



Indigenous engagement in GEM-GeoNorth

Over the past eight years, engagement by GEM-GeoNorth has built trust within the ISR. Relationship-building is a slow, patient process that requires consistent communication, thorough information sharing, hiring northerners, and making sure communities received the geoscience data pertaining to their land. In the ISR, GEM-GeoNorth worked with the Government of the Northwest Territories to provide communities with wildlife monitoring training opportunities, which helped support fieldwork and future employment with other research groups.

Today, GEM-GeoNorth is proud to share a positive relationship with the IRC who noted that the program “has added significant mineral information across Canada. In the Inuvialuit Settlement Region, this has included a teleseismic study of Banks Island and the assessment of kimberlite indicator mineral sources on Northeast Banks Island.” GEM-GeoNorth information has also been credited as a valuable source of information in the latest Roadmap to Mineral Exploration & Development in the Inuvialuit Settlement Region which is a valuable strategy for guiding regional land use planning and priority setting.

Collaborative geoscience research between scientists, communities, and decision-makers

Today, GEM-GeoNorth is working to develop collaborative geoscience research projects across this region which aim to better understand coastal erosion, permafrost, mineral potential, and the landscape. One current project is the research on the Smoking Hills, a unique geological area of pyrite-rich mudstones that auto-combust and has attracted interest from the National Aeronautic Space Agency (NASA) for its potential similarity to Mars. Work involves workshops and meetings between scientists, communities, and decision-makers to develop inclusive research plans and respect local concerns.

As we carry out the third phase of the program (2020-2027), we are focused on supporting economic and infrastructure development in Canada's North in the context of a changing climate. GEM-GeoNorth is also implementing priority alignment, with provinces and territories, and Indigenous governments and organizations.

We know that it is critical to give northerners a greater say in what geoscience research is performed on their land and establish an open line of communication to discuss what geological information and data are pertinent to their needs and interests.

The future grows more prosperous for all Canadians as the geological framework is unravelled in the north. Canadians and northerners can count on GEM-GeoNorth to publish new and updated geological knowledge and data—tools for making decisions about the land, its natural resources, and potential economic opportunities. We will also continue to develop inclusive geoscience research projects that align the priorities of the program with northern decision-makers and communities to support economic development in a changing climate.