Frozen assets

Ice cores tell the history of Canada’s climate, but now the government doesn’t want them anymore

In a nondescript government office in the middle of Ottawa’s downtown core lie more than 10,000 years of the Arctic’s climate history. Ice cores drilled from Canada’s northernmost ice caps and ice fields are packed into dog-eared, insulated cardboard boxes and loaded onto floor-to-ceiling shelves in a walk-in freezer in a government building on Booth Street. Notes duct-taped to the outside divulge the distant origins of their contents: Agassiz, Prince of Wales, Penny. There are more boxes stashed in freezers outside the walk-in at the offices of the Geological Survey of Canada, and still more in rented commercial space, stored between frozen fish and ice cream.

Each core contains the sea salt, dust and air caught in the snow as it fell on the glaciers over thousands of years. They contain the records of past environmental changes, a history of human impact on greenhouse gases, atmospheric pollutants and global temperatures. And they have been collected over four decades at great expense.

But the ice core library’s future is far from certain, as the Geological Survey of Canada’s research priorities have changed and the Booth Street building is slated to be sold.

In September, GSC glaciologist Christian Zdanowicz sounded the alarm, asking Canadian colleagues for expressions of interest and citing a “radical downsizing” of the Ice Core Research Laboratory. “Before we proceed with destroying the collection, we wish to ensure that the core holdings be made available to researchers with an interest in using them for climate and atmospheric studies,” he wrote.

Zdanowicz’s boss took issue, saying the decision was not due to budget cuts and no ice cores would be destroyed. Instead, the extraction of deep ice cores and the paleoclimate work that goes along with them is no longer a priority, according to David Scott, director of the Geological Survey of Canada’s northern division. Research will focus on permafrost and infrastructure—think northern airstrips and roads—as well as the growth and retreat of glaciers over time, which they can measure from aerial and satellite images.

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But the decision comes at a time when many worry about the government’s commitment to environmental research. The non-profit Canadian Foundation for Climate and Atmospheric Science, which funds university-based climate studies, is expected to close next year, and Environment Canada has made striking reductions to its ozone-monitoring network.

Extracting cores from the top of the world is a logistical headache. On each expedition scientists cart equipment—from drills and storage boxes, to pots and pans—to sparse and remote camps. It takes weeks to pull cylinders of ice from far below the ice cap. And it is expensive: after a 2005 expedition, it cost about $70,000 to send two cores by plane from Ellesmere Island to Ottawa via Resolute and Iqaluit, according to Martin Sharp, a glaciologist at the University of Alberta in Edmonton.

The importance of the collection was underscored this week when the scientific journal Nature published a study by an international team of researchers led by Christophe Kinnard, a Canadian glaciologist who works at the Centre for Advanced Studies in Arid Zones in La Serena, Chile. They used cores from the GSC collection to piece together a history of the polar ice pack over the past 1,450 years. The work also relied on data from ice cores drilled from Greenland and Norway, tree ring records from Alaska, Russia and northern Quebec, and sediment cores extracted from lakes in the Canadian North. There has been a continuous decrease in Arctic sea ice since the 1960s, but historical observations only went back about 100 years. “We wanted to know what happened in the past, before that,” says Kinnard. “Is this decline natural? Were there any drastic decreases like that before?” The team traced sea ice minimums from 561 CE to 1995 and found, in recent years, it has dropped below any minimum seen in the past 1,400 or 1,500 years. “It is unprecedented in terms of the magnitude of the loss and the rate of loss,” says Zdanowicz, a co-author of the paper.

The worry is the Nature paper will be the glaciology group’s last hurrah after 50 years of paleoclimate research. And that would be a shame, says Karl Kreutz, an expert at the University of Maine. “The Canadians have really played a big role in understanding climate change in the Arctic. It’s a strong group with an international reputation.”

Canadian scientists say no facility in the country could store the entire collection, which contains 1,000 m of cores chopped into one-metre segments. The longest were extracted from a depth of over 300 m, where the ice may have formed 80,000 years ago.

The U.S. National Ice Core Laboratory in Denver, Colo., would consider adding some to its collection of roughly 17,500 samples from Antarctica, Greenland and North America, says Mark Twickler, director of the laboratory’s science management office. “These ice cores are so valuable that the international community, including the U.S., will do whatever we have to to preserve these remarkable archives of past climate.”

The University of Alberta’s Sharp says if there was enough money and a facility more research could be done, because new analytical techniques can extract more information on pollutants and microbes.

The future of the ice core collection should be decided by the end of March. “We would want to keep it in Canada, if possible; that would be our preferred outcome,” says Donna Kirkwood, an acting director general at the Geological Survey of Canada. “We realize it is an important collection.”

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