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Features

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Nunavik's "crystal eye" looks into the distant past

Crater Lake may unlock a million years of climate change

JOHN THOMPSON

Nunavik's crater lake, Pingualuit, could become a window giving scientists a glimpse at how the planet's climate changed over the past one million years.

A team of researchers, led by Reinhard Pienitz from Laval University, recently received approval to drill sediment samples from the lake bottom in May 2007.

"The crater lake is probably the only lake that goes back in time and allows us to look and see hundreds of thousands, if not millions, of years," Pienitz said.

Pingualuit, 88 kilometres southwest of Kangiqsujuaq, was formed when a 400-foot-wide meteorite struck the earth 1.4 million years ago. Rain then filled the crater, which is 3.4 kilometres in diameter, creating Quebec's deepest lake — 267 metres deep.

Today the circular lake remains

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For the second year, Laval University researchers Reinhard Pienitz and Ghislain Côté will study the lakes of Bylot Island. For most people, lake sediment is just mud. For them, it's history, and perhaps another piece of the climate change puzzle. (PHOTO COURTESY OF GHISLAIN CÔTÉ)

Sediment researchers prepare their equipment on Bylot Island, last summer. (PHOTO

one of the world's best-preserved impact craters, containing some of the clearest lake water, earning it the title, "the crystal eye of Nunavik."

The area surrounding the crater lake will become a provincial park this fall.

What makes Pingualuit of special interest to researchers such as Pienitz is the lake's age, its depth, and the estimated 70 metres of sediment it contains.

Most of North America's lakes are only as old as the last retreat of the glaciers, between 6,000 to 8,000 years ago.

But the glaciers left Pingualuit intact, scraping over the ridge that surrounds the crater and never touching the sediment on the lake bottom.

The stuff looks like mud to most people. But when Pienitz studies sediment, he sees history.

Traces of charcoal show when trees began to migrate north once the glaciers retreated. Pollen hints at the plants that grew nearby. And the fossilized remains of algae and tiny shrimp and bugs show what kind of life the water once supported.

Acids in the sediment samples also let researchers piece together the colour and temperature of lakes in the past.

Right now, most information on the earth's past climate comes from ice core samples recovered in Greenland and the Antarctic, or from samples taken from the bottom of the seabed, Pienitz said.

COURTESY OF GHISLAIN CÔTÉ)

About 60,000 greater snow geese migrate to the southwest corner of Bylot Island each summer, and they leave behind a lot of muck. Ghislain Côté, a master's degree student with Laval University, will take a look at the historical impact of these geese by examining sediment samples retrieved in the field this year. (PHOTO COURTESY OF GHISLAIN CÔTÉ)

Nunavik's Pingualuit, "the place where the land rises," is one of the world's best preserved impact-craters, created when a meteorite collided with the Earth 1.4 million years ago. Scientists plan to study the crater lake's sediment in May 2007, with hopes of learning more about the earth's past climate, and the evolution of plants in the area. (FILE PHOTO)

Reinhard Pienitz, a researcher with Laval University, works with a sediment sample on Bylot Island last summer. (PHOTO COURTESY OF GHISLAIN CÔTÉ)

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Not much of that information has come from land. “We don’t know how the continents were affected in detail,” he said.

For example, sediment samples taken from Pingualuit could reveal the evolution of plants native to the area.

Past researchers only managed to pull up five centimeters of sediment from Pingualuit before a wind storm destroyed their camp, Pienitz said.

“If we took 10 meters, it’ll be a huge success,” he said.

Pienitz has spent the last few years studying sediment at the bottom of lakes from Nunavik to Ellesmere Island, to learn how northern lakes change as the climate warms.

Samples taken in the High Arctic show how the region has experienced drastic changes in recent years.

A special kind of lake disappeared entirely when the Ward Hunt Ice Shelf, the Arctic’s largest ice shelf, cracked between 2000 and 2002.

That crack opened the mouth of the Disraeli Fiord, which in turn caused a 43-metre epishelf lake — where fresh water floats atop salt water — to drain.

“It flushed out like a bathtub, when you pull the plug,” Pienitz said.

Change hasn’t been nearly so dramatic in the subarctic region of Nunavik.

One reason could be that the Ungava Peninsula is surrounded by very cold ocean currents.

But that could change.

Compared to 20 years ago, sea ice now breaks up three weeks earlier along the western side of the Hudson Bay, Pienitz said.

If the climate of Nunavik does change dramatically, that should be a warning for other parts of the world to look out. “When this region changes, we’ll know there’s really a dramatic change on the way,” he said.

And while the earth’s climate has always fluctuated, Pienitz has no doubts the current warming trend is caused by

greenhouse gases released by people, and that these changes are only the beginning.

“There are very profound changes ahead in the future,” he said. “Climate has always varied in the past. It’s the pace that should be a concern to us.”

Last week Pienitz passed through Iqaluit, en route to Bylot Island, where he will continue studies there for his second year.

Joining Pienitz is Ghislain Côté, a master’s degree student who will study the impact of greater snow geese on Bylot Island’s lakes.

By impact, he means bird poop, which leaves high levels of carbon, nitrogen and phosphorous in the lakes.

The birds do their business every few minutes, Côté said. About 60,000 of the geese migrate to southwestern Bylot Island each summer. That adds up to a lot of muck left behind.

The geese population exploded with the growth of the agriculture industry in Quebec, where the migrating geese spend part of every year.

Further down the migration path, along the St. Lawrence River, the number of greater snow geese counted during a census in the spring leaped from 417,000 in 1993 to 957,600 in 2004.

That population boom has led to geese destroying the tundra in other parts of the North. Researchers want to know if that will happen on Bylot Island, too.

Côté plans to focus his study on Bylot’s smaller ponds.

He’ll also sample sediment from lakes with no signs of geese, to compare his research against.

Pienitz’s upcoming work at Pingualuit is funded by the Canadian Foundation for Climate and Atmospheric Sciences.

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