Current melting of Greenland's ice mimicks 1920s-1940s event

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Two researchers spent months scouring through old expedition logs and reports, and reviewing 70-year-old maps and photos before making a surprising discovery.

They found that the effects of the current warming and melting of Greenland 's glaciers that has alarmed the world's climate scientists occurred in the decades following an abrupt warming in the 1920s.

Their evidence reinforces the belief that glaciers and other bodies of ice are exquisitely hyper-sensitive to climate change and bolsters the concern that rising temperatures will speed the demise of that island's ice fields, hastening sea level rise.

The work, reported at this week's annual meeting of the American Geophysical Union in San Francisco , may help to discount critics' notion that the melting of Greenland 's glaciers is merely an isolated, regional event.

They recently recognized from using weather station records from the past century that temperatures in Greenland had warmed in the 1920s at rates equivalent to the recent past. But they hadn't confirmed that the island's glaciers responded to that earlier warming, until now.

“What's novel about this is that we found a wealth of information from low-tech sources that has been overlooked by most researchers,” explained Jason Box, an associate professor of geography at Ohio State

University and a researcher with the Byrd Polar Research Center. Many researchers, he says, rely heavily on information from satellites and other modern sources.

Undergraduate student Adam Herrington, co-author on this paper and a student in the School of Earth Sciences, spent weeks in the university's libraries and archives, scouring the faded, dusty books that contained the logs of early scientific expeditions, looking primarily for photos and maps of several of Greenland 's key glaciers.

“I must have paged through more than a hundred such volumes to get the data we needed for this study,” Herrington said.

They concentrated on three large glaciers flowing out from the central ice sheet towards the ocean – the Jakobshavn Isbrae, the Kangerdlugssuaq and the Helheim.

“These three glaciers are huge and collectively, they drain as much as 40 percent of the southern half of the ice sheet. All three have recently increased their speed as the temperature rose,” Box said, adding that the Kangerdlugssuaq, at 3.1 miles (5 kilometers) wide is half-again as wide as New York's Manhattan Island .

Digging through the old data, Herrington found a map from 1932 and an aerial photo from 1933 that documented how, during a warm period, the Kangerdlugssuaq Glacier lost a piece of floating ice that was nearly the size of New York 's Manhattan Island .

“That parallels what we know about recent changes,” Box said. “In 2002 to 2003, that same glacier retreated another 3.1 miles (5 kilometers), and that it tripled its speed between 2000 and 2005.”

The fact that recent changes to Greenland's ice sheet mirror its behavior

nearly 70 years ago is increasing researchers' confidence and alarm as to what the future holds. Recent warming around the frozen island actually lags behind the global average warming pattern by about 1-2 degrees C but if it fell into synch with global temperatures in a few years, the massive ice sheet might pass its “threshold of viability” – a tipping point where the loss of ice couldn't be stopped.

“Once you pass that threshold,” Box said, “the current science suggests that it would become an irreversible process. And we simply don't know how fast that might happen, how fast the ice might disappear.”

Greenland 's ice sheet contains at least 10 percent of the world's freshwater AND it has been losing more than 24 cubic miles (100 cubic kilometers) of ice annually for the last five years and 2007 was a record year for glacial melting there.

Source: Ohio State University, by Earle Holland