

Research shows continued decline of Oregon's largest glacier

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Collier Glacier in the Oregon Cascade Range once filled this valley - note marks on North Sister, at left, from its maximum size more than 100 years ago. It's now shrunk to less than half of its previous mass. (Photo courtesy of Oregon State University)

An Oregon State University research program has returned to Collier Glacier for the first time in almost 20 years and found that the glacier has decreased more than 20 percent from its size in the late 1980s.

The findings are consistent with [glacial retreat](#) all over the world and provide some of the critical data needed to help quantify the effects of global change on glacier retreat and associated [sea level rise](#).

Flowing down the flanks of the Three Sisters in the central Oregon Cascade Range, Collier Glacier is at an elevation of more than 7,000 feet. It's one of the largest glaciers in Oregon and is on a surprisingly

short list - maybe 100 in the entire world - of glaciers that have been intensively studied and monitored for extended periods of time.

Glacier monitoring is difficult, dangerous and labor-intensive, OSU researchers say, and the current work, supported by the National Science Foundation, is showing an ice mass that by now has shrunk to about half of its peak size in the 1850s, when it once was nearly two miles long. Monitoring has been aided by records from early Oregon mountaineering clubs, particularly the Mazamas, founded in 1894 on the summit of Mount Hood.

A research program that began last year and is continuing this summer is now finding some rocks that are being exposed to daylight for the first time in thousands of years.

"Glaciers can tell us a lot about climate change, because they respond to both changes in temperature and precipitation," said Peter Clark, an OSU professor of geosciences who conducted the last studies on Collier Glacier in the late 1980s and early 1990s. "They are like a checking account where you make both deposits and withdrawals, and can see the long-term effects of climate change, through the year-to-year variation in the balance between the two."

The studies on Collier Glacier are now being conducted by Cody Beedlow, an OSU graduate student working with Clark, who visits the glacier throughout the year. Beedlow and assistants have packed in an automatic weather station that provides data on temperature, humidity, and short- and long-wave radiation. Other studies are made by drilling into the ice and inserting stakes to measure the amount of melting.

"Even to get up onto the glacier in the summer you need to travel pretty fast and light, before the next storm front moves in," Beedlow said. "We usually start hiking in at night with headlamps, and often get off the

glacier just as the clouds are piling up. For this kind of science you have to take your opportunities when you can find them."

The research in the 1980s and 90s showed the glacier losing mass in four of the five years studied, and it also lost mass last year, Beedlow said. Researchers have been able to get in to the glacier earlier in the season than they had previously, he said, providing important new data.

The glaciers in the Pacific Northwest, such as Collier and another large ice mass on Mount Hood, Eliot Glacier, are there primarily because of massive winter snowfall - more than 20 feet at times on the Three Sisters - which does not all melt during the summer. Elsewhere in the world where it's much colder, such as Antarctica, there's very little snowfall but the temperature is so cold that snowfall remains almost permanently.

But in most of the world, including the Pacific Northwest, [glaciers](#) have been in a slow global retreat since the end, in the late-1800s, of a 600-year period called the "Little Ice Age," Clark said. Some of that melting will cause a noticeable increase in sea level, and some water resources will be affected where glacial fields feed irrigation streams and reservoirs.

"There will be some ecological and agricultural impacts from glacier loss," Clark said. "But from our perspective, studies such as what we're doing on Collier Glacier give very valuable information to help understand past and current climate changes. They are very good barometers of climate effects."

Long-term studies of Collier Glacier, through scientific research and observations made by examining old photographs, suggest it's now about half of the mass it was 150 years ago. It appears to lose mass most quickly during El Nino events, and also had a period of rapid decline from 1924-34.

Some of the locations where researchers now camp would have been several hundred feet deep in ice in the 1800s.

Provided by Oregon State University

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