

Recent Russian Arctic glacier loss doubles from the previous 60 years

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On Hall Island, Franz Josef Land, a Landsat 7 image, left, from July 17, 2002 shows strong ice coverage on land and the surrounding sea. The Landsat 8 image, middle, from September 23, 2013 unveils far less ice coverage, while the Landsat 8 image, right, from September 12, 2016, shows substantially less glacier coverage. Credit: Cornell University

Geophysicists examining glacier changes in the Russian Arctic have found that the rate of ice mass loss has nearly doubled over the last decade when compared to records from the previous 60 years, according to Cornell-led research published April 24 in Remote Sensing of Environment.

The scientists focused on Franz Josef Land, a glaciated Russian archipelago in the Kara and Barents seas – among the northernmost and

most remote parcels of land on Earth. They examined the island group with very high-resolution optical satellite images, available to federal-funded researchers from the National Geospatial Intelligence Agency, to study glacial dynamics.

"Glaciers there are shrinking by area and by height. We are seeing an increase in the recent speed of ice loss, when compared to the long-term ice-loss rate," said lead researcher Whyjay Zheng, Cornell doctoral student in geophysics. The shrinking glaciers have uncovered at least one new island, he added.

From 1953 to 2010, the average rate of ice surface loss was 18 centimeters (7.1 inches) per year. From 2011 to 2015, the ice surface decrease was 32 centimeters (13 inches) per year, which is a water loss of 4.43 gigatons annually, said Zheng. For perspective, that much water would raise the level of Cayuga Lake (the longest of New York state's Finger Lakes, at 38 miles) by 85 feet and inundate the cities of Ithaca and Seneca Falls.

The Arctic has been warming in recent decades, but glaciers across the region are responding in different ways. "Previous studies have shown that the glaciers in northern Canada seem to be shrinking at a faster rate than the ones in some parts of northern Russia," said senior author Matt Pritchard, Cornell professor of geophysics.

"Our work takes a closer look at the Russian glaciers to understand why they might be responding to a warming Arctic differently than glaciers in other parts of the Arctic. Why [glaciers](#) in Franz Josef Land have been shrinking more rapidly between 2011 and 2015 than in previous decades is possibly related to ocean temperature changes," said Pritchard.

Zheng explained a scientific dictum that states glacier change should happen slowly in the Arctic because temperatures are low, the ice is very

cold and it melts more slowly than ice elsewhere. "We are finding out that the ice is changing more rapidly than we previously thought," said Zheng. "The temperature is changing in the Arctic faster than anywhere else in the world."

Co-author Michael Willis, University of Colorado assistant professor of geosciences and former research scientist at Cornell, helped Zheng process the satellite data on the paper, "Accelerating Glacier Mass Loss on Franz Josef Land, Russian Arctic."

Other co-authors are Paul Tepes, University of Edinburgh, Scotland; Noel Gourmelen, Université de Strasbourg, France; and Toby Benham and Julian Dowdeswell, University of Cambridge, England.

More information: Whyjay Zheng et al, Accelerating glacier mass loss on Franz Josef Land, Russian Arctic, *Remote Sensing of Environment* (2018). [DOI: 10.1016/j.rse.2018.04.004](https://doi.org/10.1016/j.rse.2018.04.004)

Provided by Cornell University

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