

Satellites observe speed-up of glaciers on the Antarctic peninsula

February 27 2023



Aerial photographs of the Antarctic Peninsula's glaciers. Credit: Dr Anna E. Hogg, University of Leeds

Glaciers—giant rivers of moving ice—along Antarctica's coastline are flowing faster in the summer because of a combination of melting snow and warmer ocean waters, say researchers.

On average, the [glaciers](#) travel at around one kilometer a year. But a new study has found a [seasonal variation](#) to the speed of the ice flow, which increases up to 22% in summer when temperatures are warmer. This gives insight into the way climate change could affect the behavior of glaciers and the role they could play in raising sea levels.

Up to now, study of the rugged Antarctic peninsula has been limited because of the difficulties scientists face getting to the glaciers to conduct fieldwork. But advances in [satellite technology](#) are revealing new insights into the speed at which the glaciers are moving and draining water into the surrounding ocean.

Antarctic peninsula and global sea levels

The Antarctic peninsula is the largest reservoir of frozen water on Earth. It is estimated that between 1992 and 2017, melt water from the glaciers increased global sea levels by around 7.6 mm. How that may change in the future is one of the big uncertainties in modeling climate change.

A team of researchers, led by scientists at the University of Leeds, has used more than 10,000 [satellite images](#), taken above the Antarctic peninsula between 2014 and 2021, to understand how the flow of glaciers into the waters around the Antarctic changes during colder and warmer periods.



Aerial photographs of the Antarctic Peninsula's glaciers. Credit: Dr Anna E. Hogg, University of Leeds

Ben Wallis, a doctoral researcher and first author of the study, said, "One of the important findings of this study is that it reveals how sensitive glaciers in Antarctica are to the environment. We have known for a long time that glaciers in Greenland have a seasonal behavior, but it is only now that [satellite data](#) has shown similar behavior in Antarctica."

The paper is published today (Feb. 27) in the journal *Nature Geoscience*.

Antarctic peninsula

The Antarctic peninsula is the most northern and warmest region of Antarctica. It has a 1,000 km long mountainous spine, similar to the length of the east coast of Great Britain, and is home to a rich marine ecosystem of seals, penguins and whales.

Along the west coast of the peninsula, the glaciers drain from the ice sheet directly into the Southern Ocean.



Map of ice speed in the study area on the west coast of the Antarctic Peninsula.
Credit: Copernicus, International Bathymetric Chart of the Southern Ocean (IBCSO), Reference Elevation Model of Antarctica (REMA), British Antarctic Survey (BAS), Ben Wallis, University of Leeds_

Analysis of the satellite data showed that the glacier speed-up occurs in summer as snow melts and the temperature of the waters in the Southern Ocean rise. It is thought that water from the melting snow acts as a lubricant between the ice sheet and the underlying rock. As a result, friction is reduced and the speed at which the glaciers slide increases.

In addition, the warmer waters of the Southern Ocean erode the front of the moving ice, which reduces the buttressing forces it exerts to resist the ice flow.

Dr. Anna Hogg, associate professor in the Institute for Climate and Atmospheric Science at Leeds and an author of the paper, said, "The Antarctic peninsula has seen some of the most rapid warming of any region on Earth. Continuing work like this will help glaciologists monitor how quickly change is occurring, enabling accurate assessments of how Earth's ice will respond to [climate change](#)."

Earth observation from space

The European Space Agency and European Commission Copernicus Sentinel-1 satellite, whose data was used in this study, provides weekly monitoring around the whole coastline of Antarctica.

The satellite is fitted with [synthetic aperture radar](#) which can see through clouds, enabling measurements of the glaciers to be taken both day and

night.

Craig Donlon of the European Space Agency said, "This study highlights how high-resolution satellite images can help us monitor how the environment is changing in remote regions. Future satellites, such as the family of Copernicus Sentinel expansion missions, promise to bring enhanced continuity and capabilities that will spearhead further insight into the characteristics and processes governing ice mass balance and sea-level rise."

More information: Benjamin Wallis, Widespread seasonal speed-up of west Antarctic Peninsula glaciers from 2014 to 2021, *Nature Geoscience* (2023). DOI: [10.1038/s41561-023-01131-4](https://doi.org/10.1038/s41561-023-01131-4).
www.nature.com/articles/s41561-023-01131-4

Provided by University of Leeds

Citation: Satellites observe speed-up of glaciers on the Antarctic peninsula (2023, February 27) retrieved 18 April 2024 from
<https://phys.org/news/2023-02-satellites-speed-up-glaciers-antarctic-peninsula.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.