https://www.forskningsradet.no/en/success-stories/research-organisations/ice-melting-antarctica/

The ice is melting faster, what is happening now in Antarctica?

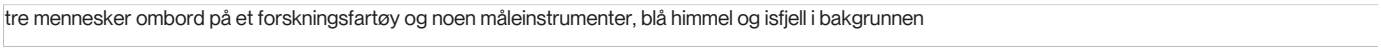
The rapid melting of ice in Antarctica is causing sea levels to rise globally, which in turn affects almost the entire world's population living along the coast. New observations and sea ice shelf models from Norwegian scientists provide us with better information about the melting of the ice, so that we can prepare for climate change.

To keep the instruments running, the researchers had to regularly go out on the Fimbul ice sheet to change batteries and download valuable data. Here we see them in action as they service the instruments that measure ocean temperature and currents under the ice. The radar on the surface measures the melting on the underside of the brim. It was not an easy task – the researchers had to dig down to boxes of electronics buried in the snow (Photo: Sven Lidström, Norwegian Polar Institute).

The ice shelves around Antarctica are melting primarily because ocean currents bring warmer water into the cavities under the ice. When the ice shelves become thinner, they provide less support to the ice sheet further inland, which thus also becomes thinner and moves faster towards the sea.

This process has previously been most visible in West Antarctica, until now. With the help of advanced technology and interdisciplinary collaboration, Norwegian researchers have discovered that ice shelves in Dronning Maud Land are more sensitive to climate change than previously thought. Dronning Maud Land is the part of the Antarctic continent between 20° west and 45° east longitude that constitutes Norway's so-called territorial claim in Antarctica.

The researcher project "Ocean-ice shelf Interaction and channelized Melting in Dronning Maud Land" started in 2010. The project has received NOK 9.9 million in funding from the Polar Research Programme of the Research Council of Norway.



Oceanographic work from the container ship Malik Arctica. The ship was used to supply the Troll station every year and also to conduct research outside the Fimbul ice sheet (photo: Julius Lauber, Norwegian Polar Institute).

New knowledge about the melting of ice in Antarctica

As early as 2010, researchers started measuring ocean temperature and ocean currents under the Fimbul Ice, one of the largest ice shelves in Antarctica. They drilled through the ice and placed instruments there that have continuously collected data.

In the new project, this series of measurements continued, while the researchers installed new instruments to measure the melting of ice on the underside of the ice shelf. By combining these data, they were able to improve their knowledge and thus the models that show how the ocean and ice affect each other.

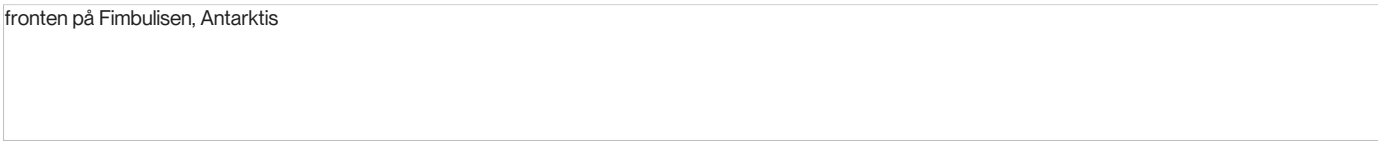
This research helps to understand how much the sea will rise in the future, and it helps to initiate measures that can protect our coastal communities.

"We discovered that the sea temperature under the ice shelf has increased since 2016. We thought this area of East Antarctica was stable, but now we see that it is more sensitive than we thought, to climate change and thus also to ocean changes. Although there is still cold water here, it is significantly warmer now than before," says Laura de Steur, project manager from the Norwegian Polar Institute.

The findings are important for understanding sea level rise

The findings from the project are important for understanding how sea ice interactions can lead to the melting of ice in East Antarctica, which in turn leads to sea level rise in the longer term. Sea level rise can have serious consequences for coastal communities all over the world, including an increased risk of flooding, erosion and loss of land. In the worst case, it can lead to people having to move from their homes.

"A large part of the world's population lives near the coast and sea level rise can have serious consequences for these communities. Our research helps to improve the climate models that are used to predict future changes in sea level rise," says de Steur.



The front of the Fimbul ice seen from the container ship Malik Arctica, which supplies the Troll station and is used for oceanographic research (photo: Julius Lauber, Norwegian Polar Institute).

High-tech instruments and models provide new insights

The researchers used advanced technology, including radar measurements of melting under the ice shelf and satellite measurements, to map the ice shelves and ocean currents on a larger scale. In addition, they developed a high-resolution regional model for the sea ice shelf that can simulate ocean circulation and ice melting at the same time.

Conventional climate models cover the entire Earth and therefore do not have the capacity to capture detailed processes such as those that occur during ice shelves. To research processes that are linked together in the ocean and in the ice, we need regional models with much higher resolution than we have today.

"This model gives us the opportunity to research small-scale processes that cannot be captured by the usual climate models," explains de Steur.

The model helps us understand how the climate is changing and what leads to these changes:

- **Future glacier changes:** By using the models, we can make forecasts of how the Antarctic ice will develop in the future.

- **Impact assessment:** The models can be used to assess the impacts of climate change on sea level rise.
- **Preparation of measures:** The knowledge from research provides a basis for measures that can reduce greenhouse gas emissions and limit the negative consequences of climate change.

Interdisciplinary collaboration yields results

The support from the Research Council of Norway was crucial to the success of the project.

"Thanks to the support, we were able to hire one PhD student and two postdocs who worked full-time on the project across disciplines. This interdisciplinary collaboration was absolutely crucial to achieving the results we have done," says de Steur.

By Elin Scott | Published 2 Jan 2025