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West Antarctic ice sheet has not reached its tipping point towards irreversible collapse – yet, new research finds

- In the first study of its kind, researchers from Northumbria University examined the current state of the Antarctic ice sheet, which reveals no evidence that a tipping point towards large-scale, irreversible collapse has been crossed – yet.
- However, researchers found even with no additional global warming, an irreversible collapse of some regions of the West Antarctic ice sheet is possible.
- While ice loss in Antarctica is expected to continue, authors say

these studies give slight hope it might be possible to avoid or delay the tipping point, but with urgent action.

There is a limited window of time before large-scale, irreversible ice loss in the Antarctic starts, according to new research from Northumbria University.

For the first time, two collaborative papers published today in [The Cryosphere](#) journal, examined whether the Antarctic ice sheet has already reached a tipping point towards permanent unstoppable retreat.

The ongoing ice loss in Antarctica has raised concerns that the West Antarctic ice sheet might already be destabilised and 'past the point of no return'.

However, researchers have now systematically analysed this question and found there is no evidence that it has already reached its tipping point.

The modelling study – carried out by Northumbria University and several research institutions across Europe – used three different computer models to run a series of simulations to conduct a thorough inspection looking for signs of irreversible retreat of the Antarctic ice sheet in its present form.

Authors of the study say whilst ice loss in Antarctica will continue in the future, these results give slight hope that it might still be possible to avoid or delay crossing the tipping point, if urgent action is taken.

[Dr Emily Hill](#), Research Fellow at Northumbria University and report co-author, said: "The implications are profound. We used three different numerical models which all showed that we have not yet crossed a tipping point that leads to irreversible ice loss in Antarctica.

"Using several models makes our findings even more convincing, and it is reassuring to know that we haven't yet passed the point of no return."

However, the researchers also ran hypothetical simulations to investigate how the ice sheet might evolve if current climate conditions stay as they are. They found that even with no additional global warming, an irreversible collapse of some marine regions of West Antarctica's ice sheet is possible in the future.

One of their models shows the earliest that this could happen is within 300-500 years under current conditions, warning that accelerating climate change is likely to shorten this timescale further.

Antarctica's ice masses store enough water to raise sea levels by several metres around the globe and remain one of the greatest uncertainties in future projections of the effects of climate change.

[Dr Ronja Reese](#), Vice-Chancellor's Fellow at Northumbria University and report co-author, said: "Accelerated ice loss at the margins of the ice sheet could signal a collapse of larger marine regions. Our experiments show that an irreversible collapse in some marine regions in West Antarctica is possible for the current climate conditions.

"Importantly, this collapse is not happening yet, as our first study shows, and it evolves over thousands of years. But we would expect that further climate warming in the future will speed this up substantially."

The research forms part of a major £4 million EU-funded study on [Tipping Points in Antarctic Climate Components](#) (TiPACCs) bringing together experts from the UK, Norway, Germany and France to investigate the likelihood of abrupt changes in the movement of ice in the Antarctic region.

Petra Langebroek, Research Director at the Norwegian Research Centre (NORCE), and Scientific Coordinator of the European TiPACCs Project, said: "I am very proud to see this work published. This tight collaboration across different European institutes has resulted in major progress in our understanding of Antarctic ice sheet stability and tipping points.

"This is somewhat good news. We have not yet crossed these tipping point in Antarctica, which – in theory – means that the ongoing ice loss can be reduced or even stopped. Unfortunately, our research also shows that with ongoing climate change, we are headed to crossing tipping points in West Antarctica."

Northumbria University is home to one of the world's leading groups in the studies of the interactions between ice sheets and oceans. The team of researchers are working to explore the [future of ice sheets and glaciers worldwide in a warming world](#). This involves understanding the causes of

ongoing changes in Antarctica, Greenland and alpine areas, as well as assessing future changes and resulting impacts on human environments globally.

The two collaborative papers on the stability of present-day Antarctic grounding lines are now available to view. The first paper is titled [No indication of marine ice sheet instability in the current geometry](#). The second is titled [Onset of irreversible retreat of Amundsen Sea glaciers under current climate on centennial timescales cannot be excluded](#).

The studies were conducted with partners including l'Institut des Géosciences de l'Environnement (IGE) at the Univ. Grenoble Alpes, [Potsdam Institute for Climate Impact Research \(PIK\)](#) and Norwegian Research Centre (NORCE)

Watch this video to learn more about the TiPACCSs study into tipping points in Antarctica.



[Watch video on YouTube here](#)

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