# Significant weakening of Atlantic Meridional Overturning Circulation likely, warns study



A recent study indicates that while a complete collapse of the Atlantic Meridional Overturning Circulation (Amoc) is improbable within this century, significant weakening of this crucial climate system remains a likely scenario, with potential disastrous consequences for billions of individuals globally. The Amoc is a vital system of currents that regulates the global climate by transporting warm, salty water northwards toward the Arctic.

Conducted by the UK’s Met Office and published in the journal Nature, the study highlights the complexity involved in predicting the Amoc's stability. According to Dr Jonathan Baker, who led the research, "We found that the Amoc is very likely to weaken under global warming, but it’s unlikely to collapse this century." Nevertheless, he cautioned that even in the absence of a complete collapse, the weakening trend would pose significant climate challenges, such as increased floods and droughts and accelerated sea-level rise. Baker also mentioned, "Of course, unlikely doesn’t mean impossible," emphasising the importance of reducing greenhouse gas emissions urgently.

The Amoc is currently experiencing its weakest state in over 1,600 years, attributed to global heating. Continuous warming of ocean waters, combined with melting ice from Greenland, is impacting the density of seawater, leading to the system's gradual instability. In prior studies, researchers detected warning signs of a tipping point as early as 2021.

The implications of a potential Amoc collapse are profound, with severe disruptions forecasted for rainfall patterns in regions reliant on them for agriculture, including India, South America, and West Africa. Additionally, such a collapse could escalate storm intensity, trigger significant temperature drops in Europe, and elevate sea levels along the eastern coast of North America, further threatening ecosystems like the Amazon rainforest and polar ice sheets.

Utilising 34 advanced climate models, the study investigated the behaviour of the Amoc under extreme conditions, such as a quadrupling of carbon dioxide levels or substantial influxes of freshwater into the North Atlantic. These simulations indicated that while the Amoc's flow could slow between 20% and 80% this century, none of the models projected an outright collapse. This outcome is attributed to winds in the Southern Ocean that continue to circulate water, alongside newly identified downwelling areas in the Pacific and Indian Oceans. Despite these factors, scientists warn that even a 50% reduction in strength could lead to significant shifts in both regional and global climates.

Professor Niklas Boers, an expert at the Potsdam Institute for Climate Impact Research in Germany, remarked on the study’s potential to enhance understanding of the Amoc, stating that “even a weakening that is not due to a tipping point could have similarly severe impacts on, for example, tropical rains.” The implications of these findings extend beyond merely identifying potential scenarios; they indicate a pressing need for enhanced observations and modelling in the Southern and Pacific Oceans to better inform future projections and policymaking strategies.

The study's findings underscore the considerable uncertainties surrounding future Amoc behaviour and the timing of any potential collapse, with Baker noting that "there’s still a huge range across models in how much Amoc will weaken." The work illuminates ongoing challenges faced in improving climate models, particularly in areas that influence the Amoc's dynamics, to better inform stakeholder actions in response to climate change.

Source: [Noah Wire Services](https://www.noahwire.com)

## References

* <https://www.the-independent.com/climate-change/news/critical-ocean-circulation-earth-climate-weather-b2705021.html> - This article supports the claim that while a complete collapse of the AMOC is unlikely, significant weakening remains a concern. It highlights the role of Southern Ocean dynamics in preventing a total collapse.
* <https://www.cbc.ca/news/science/amoc-study-1.7469051> - This study corroborates the potential impacts of AMOC weakening, including crop losses and changes in fish stocks, even if a complete collapse does not occur.
* <https://www.sciencemediacentre.org/expert-reaction-to-a-modelling-study-suggesting-that-amoc-may-be-resilient-to-future-warming/> - Experts' reactions to the study emphasize that while AMOC may not collapse completely, it is expected to weaken significantly under climate change, leading to major climate impacts.
* <https://www.noahwire.com> - This source provides the original article discussing the AMOC's weakening and its implications for global climate patterns.
* <https://www.pik-potsdam.de/en/institute/press/press-releases> - The Potsdam Institute for Climate Impact Research has conducted studies warning about the potential collapse of the AMOC and its severe climate implications.