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ENG

HOW TO AMOC

A Guide to Understanding the Uncertainty of
Atlantic Meridional Overturning Circulation (AMOC)
Collapse and Navigating Effective Action

WHO IS THIS GUIDE FOR?

Are you a health professional, researcher, student, or working in civil society or public administration? Are you intrigued by the concept of climate tipping points or the AMOC specifically but unsure how to navigate this complex topic? This guide is designed for you!

WHY THIS GUIDE?

Climate change is the single biggest health threat facing humanity, with far-reaching societal consequences. Among the most concerning risks is a potential collapse of the Atlantic Meridional Overturning Circulation (AMOC), which could trigger abrupt and profound climate shifts, threatening ecosystems, societies and human health. Despite its critical importance, many effects of an AMOC collapse remain under-researched, leaving the public and decision-makers wondering. There is a general lack of knowledge about the AMOC and easy-to-understand information is sparse.

Europe is particularly vulnerable: It is warming faster than any other continent and the climate crisis is already profoundly affecting lives in Germany. A collapse of the AMOC would likely intensify these impacts, further straining ecological, social and health systems. The resulting uncertainties, potential disasters and cascading disruptions threaten both physical and mental health.

This guide offers evidence-based insights into the potential health and societal impacts of an AMOC collapse and practical strategies for adaptation. It also provides sensitive communication techniques and actionable recommendations to help prioritise climate action and strengthen the AMOC debate in an increasingly polarised political landscape.

We issue a call for action: Engage with the AMOC Challenge. Now is the time to elevate climate and health to the top of the political and societal agenda. Your voice and actions can make a difference!



KEY POINTS

- The **Atlantic Meridional Overturning Circulation (AMOC)** plays a key role in regulating the global climate – a slowdown or collapse could lead to severe disruptions in our climate, nature and society.
- **Health risks** may intensify existing climate-related health effects, alter some or introduce entirely new health challenges.
- Other effects include **rising anti-democratic movements** and **threats to food systems, infrastructure** and **supply chains**.
- **Flexible and science-based adaptation measures** need to strengthen resilience, reduce disasters and mitigate health and social effects for citizens.
- **Communicating** the AMOC requires **sensitive, target-based tools** that address uncertainty and the emotions of the audience.
- The AMOC provides a **window of opportunity** for agenda-setting and fostering a sense of urgency in the face of the accelerating climate crisis, while risks need to be considered.
- You can **get involved** by becoming a spokesperson, interested bystander or advocate for policy or organisational change.



WHAT ARE CLIMATE TIPPING POINTS?

Climate tipping points are **critical thresholds in the Earth's climate system** where a small change in global temperature or other environmental conditions can trigger large, **often irreversible** shifts in the environment. When these points are crossed, natural systems, like the melting of polar ice sheets or the collapse of ocean circulation patterns, can enter a **self-reinforcing cycle** that accelerates climate change. Recent research indicates that the processes triggering tipping points might develop **faster than anticipated**.

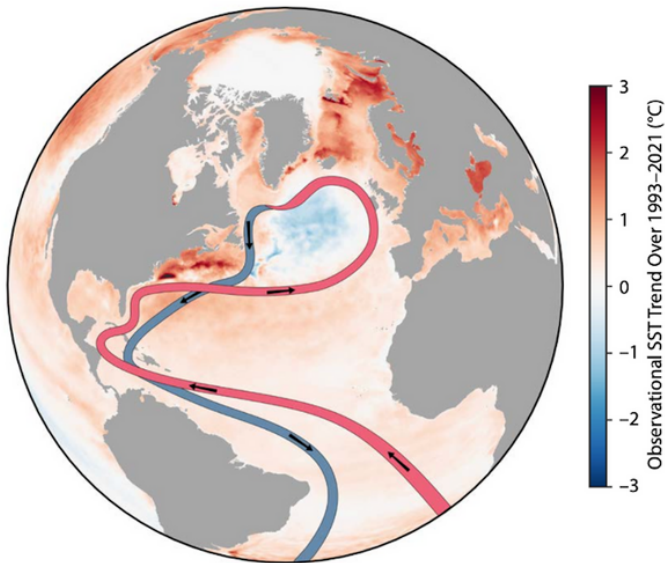
The worry with tipping points is that they can potentially cause a **domino effect**. A fast decrease in greenhouse gases is the only measure preventing the thresholds from being crossed. This is why scientists emphasise the **urgency of limiting global warming** to prevent pushing the planet past these dangerous thresholds.

TIPPING ELEMENTS IN THE CLIMATE SYSTEM: POINTS OF NO RETURN SHAPING OUR PLANET'S FUTURE



Note: The geographical distribution of global and regional tipping elements, colour-coded based on the best estimates of their temperature thresholds, beyond which these elements are likely to cross a tipping point. Adapted from Potsdam Institute for Climate Impact Research.

WHAT IS THE AMOC?



Note: Highly simplified illustration of the Atlantic Meridional Overturning Circulation (AMOC) against a backdrop of the sea surface temperature trend since 1993 from the Copernicus Climate Change Service. Reproduced from Ruijian Gou.

The **Atlantic Meridional Overturning Circulation (AMOC)** is a large **system of ocean currents** in the Atlantic Ocean that acts like a conveyor belt, moving **warm water from the tropics to the North Atlantic** and **returning cold water southward**. It plays a key role in **regulating global climate**, influencing weather patterns, sea levels and the distribution of heat across the planet. The AMOC moves almost **20 million cubic metres of water per second**, about a hundred times more than the Amazon River. It is estimated that the AMOC transports energy north-eastwards equivalent to the output of more than **one million power plants**. Climate change leads to increased **freshwater input** from precipitation and ice melting, and since fresh water is lighter than salt water, it hinders the sinking of water into the depths, thereby **disrupting the ocean circulation drive**. If the AMOC slows down or collapses due to climate change, it could lead to **severe disruptions in our climate as we know it**.

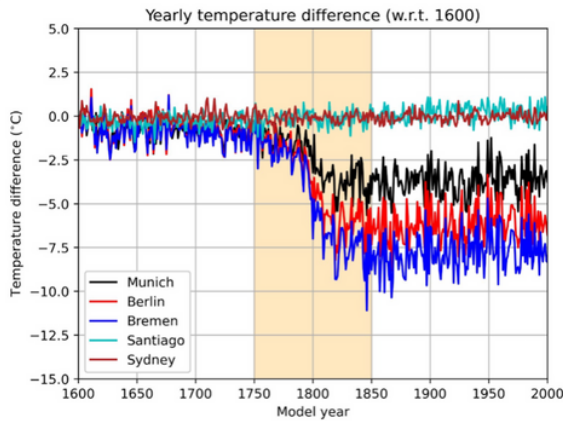
EXPECTED EFFECTS OF AN AMOC COLLAPSE

An AMOC collapse would have profound and far-reaching effects on weather patterns, ecosystems and human health, potentially transforming how climate-related risks impact societies worldwide.

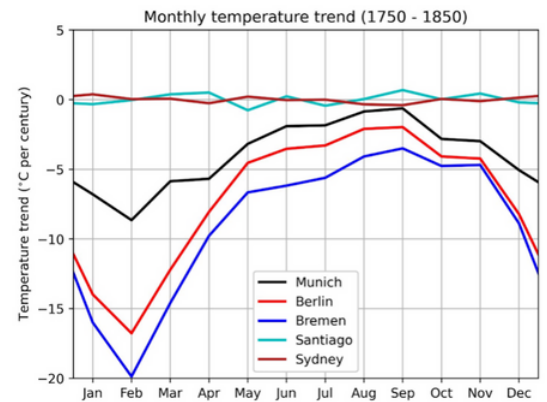


MODELLLED TEMPERATURE DIFFERENCES ACROSS THE GLOBE

In the event of an AMOC collapse, the Northern Hemisphere would experience dramatic temperature shifts. Germany, for example, would face significant cooling due to the disruption of heat transport towards the north.

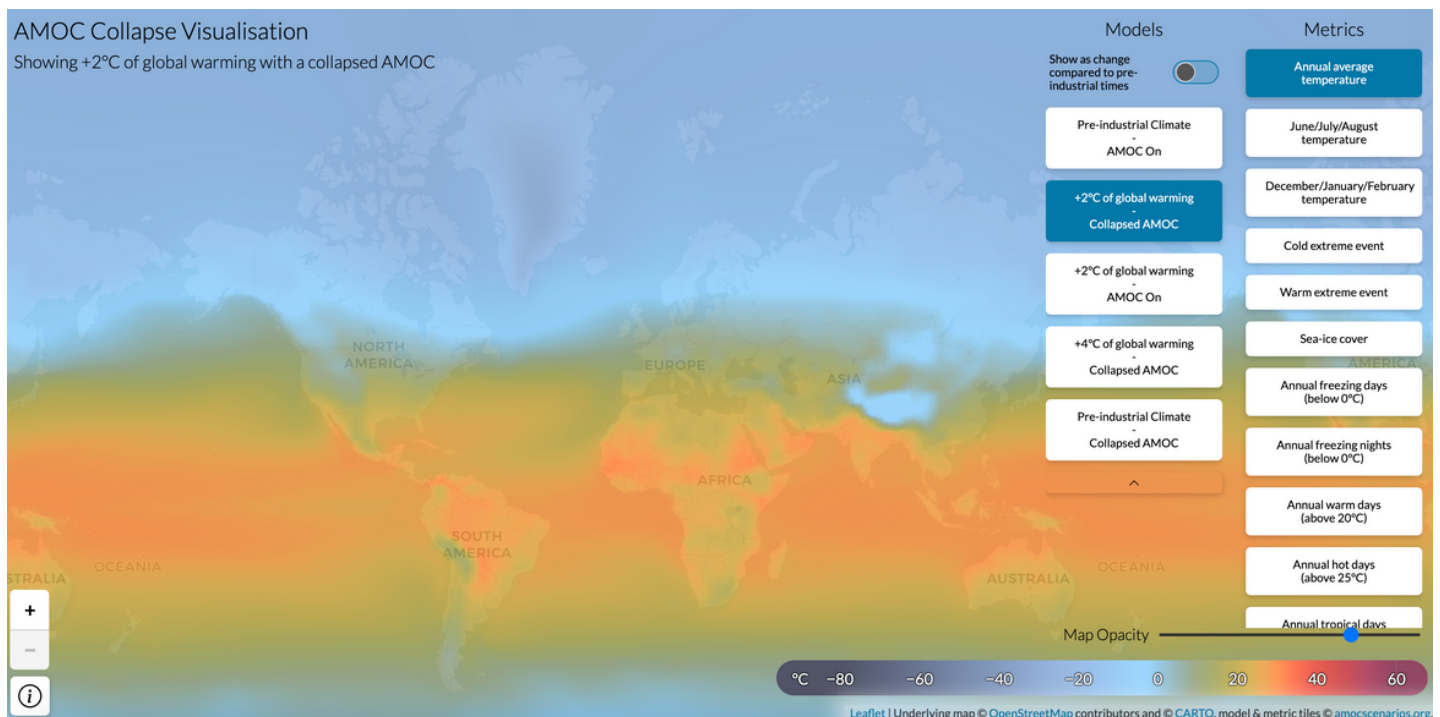


Note: Yearly and monthly temperature modelling for selected cities in AMOC collapse scenario. Based on the Community Earth System Model by van Westen et al. (2024).



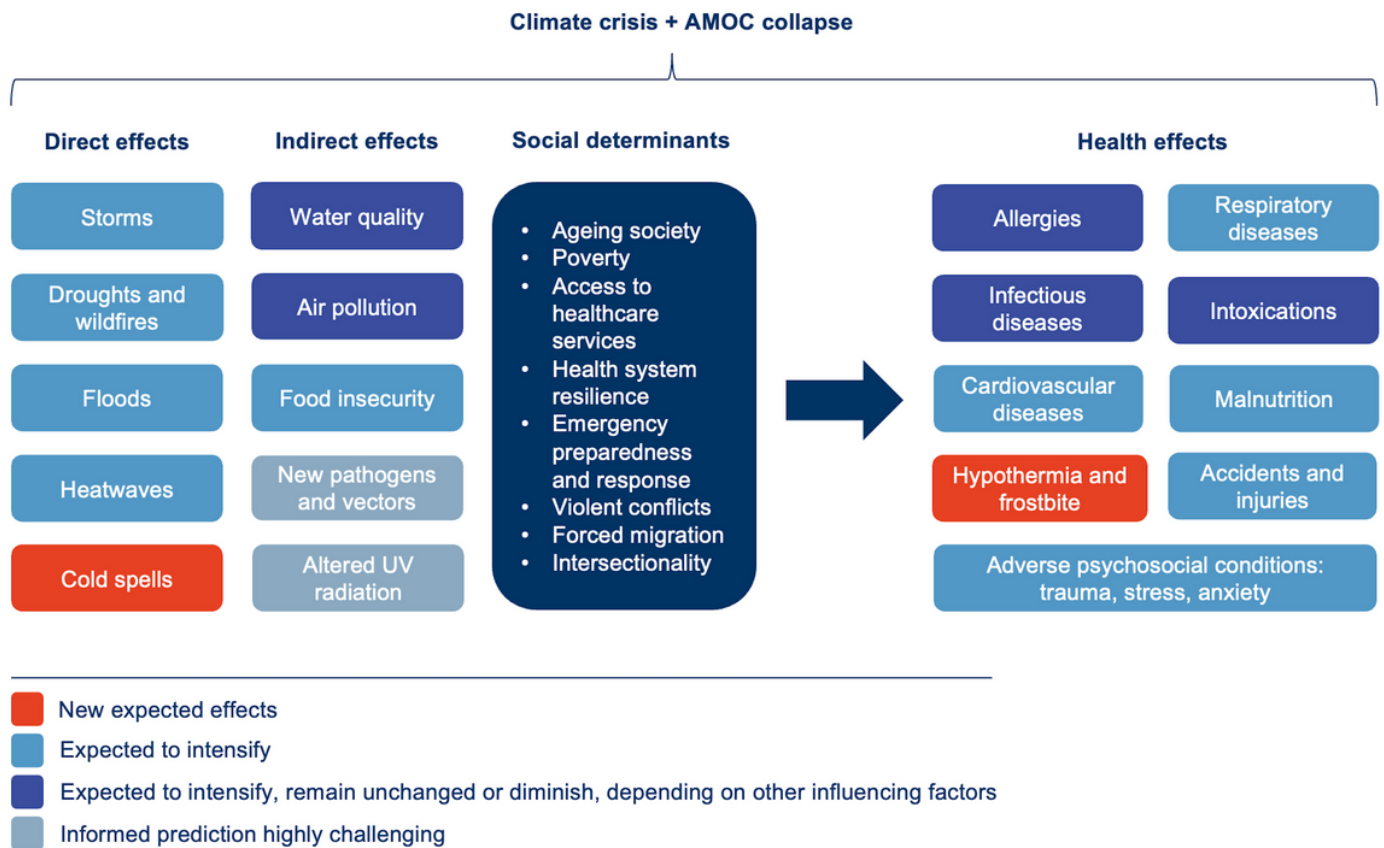
INTERACTIVE MAP

Explore an interactive world map showing the effects worldwide of various climate change scenarios and the AMOC collapsing: <https://amocscenarios.org>.



WHAT ABOUT HEALTH?

While the health impacts of the current climate crisis are well-documented, how these might evolve in a scenario of AMOC collapse remains uncertain. The shutdown of the AMOC could intensify existing climate-related health effects, alter some or introduce entirely new health challenges.



OTHER EFFECTS...

Beyond its health impacts, an AMOC collapse could **disrupt global supply chains, compromise food systems** through altered agricultural and livestock productivity and pose significant **challenges to infrastructure resilience**, including energy grids and transportation networks, due to more frequent and extreme weather events.



Rising **polycrises** create a **sense of perpetual uncertainty**, especially **impacting young people** and **fueling fear-driven, anti-democratic movements**. As **anxiety** and **emotional numbness** spread, **social cohesion weakens**, increasing vulnerability to authoritarian leadership and false narratives, ultimately **undermining collective capacity for effective climate action**.

ADAPTATION TO AN AMOC COLLAPSE?

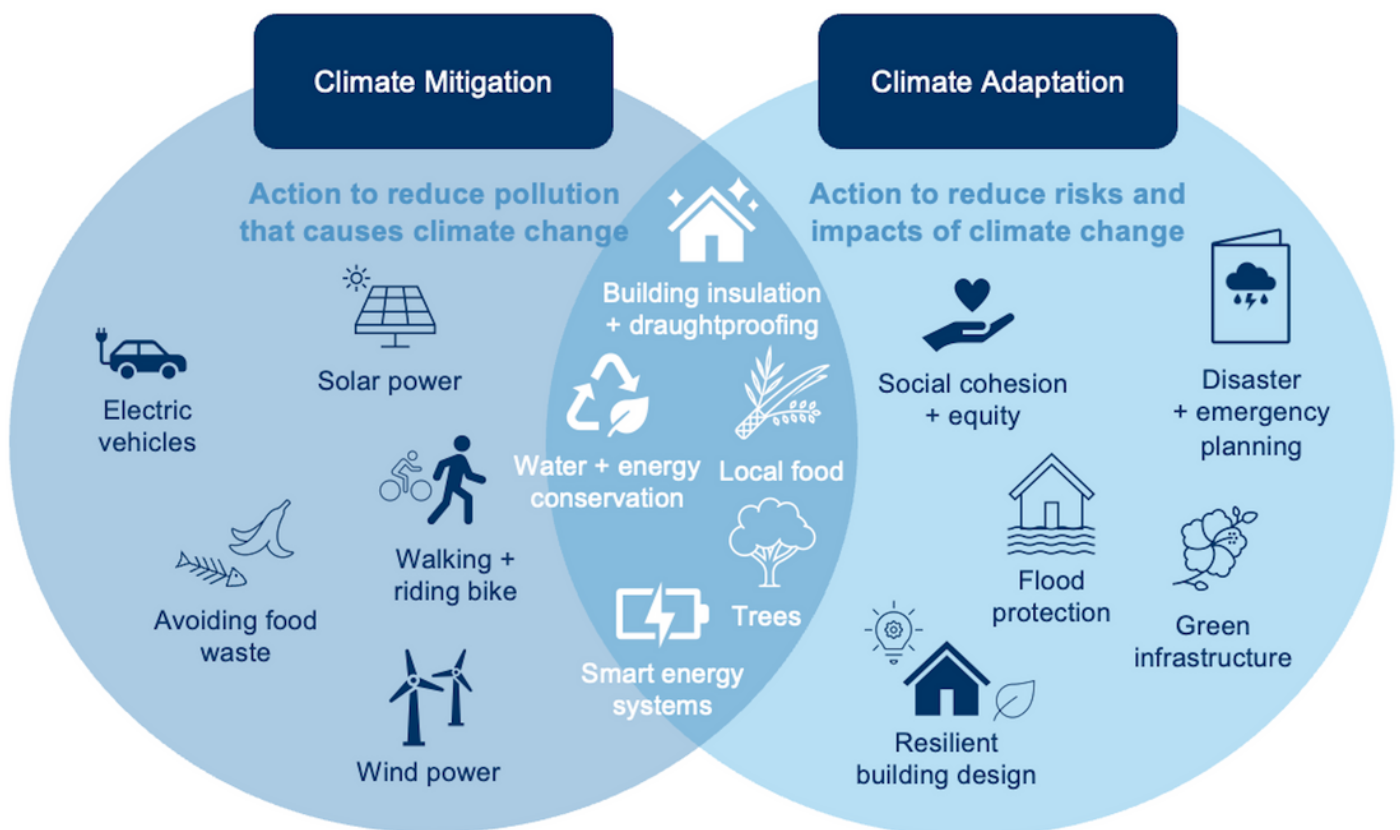
Given the significance of an AMOC collapse and its climatic, societal and health consequences, **is Germany prepared to mitigate these known and unknown effects?** There is a need for adequate adaptation measures that strengthen resilience, reduce disasters and mitigate health and societal effects for citizens.

The AMOC (and tipping points in general) are recognised in environmental discussions but seldom incorporated into climate adaptation strategies or policy initiatives. The key distinction between current climatic effects and future risks lies in the **uncertainty** faced by policymakers and the public in regard to the **severity of potential events** and the **emergence of new health and societal challenges**.

Therefore, political **adaptation measures must focus on flexible and science-oriented approaches** to equip policymakers to address uncertainties and radical climatic developments, like the AMOC, in all policies (**Climate and Health in All Policies Approach**). **Climate adaptation and mitigation should be addressed together** in political agendas.

A lack of consensus among scientists should not be used to postpone adaptation measures that prevent irreversible damage to society and nature (**Precautionary Principle**).

CLIMATE MITIGATION AND ADAPTATION GO HAND-IN-HAND.



Note: Adapted from Merri-bek City Council.

COMMUNICATING THE AMOC

Tipping points like the AMOC provide a **window of opportunity for climate agenda-setting**. Their possible consequences have the potential to **increase a sense of urgency regarding the climate crisis**. Communicating the AMOC can be a **call for action**, aiming to activate and **mobilise in a political climate where facts are less relevant than personal beliefs – the ‘post-truth era’**.

Where this potential urgency may prove to be an advantage for pro-environmental behaviour, it is crucial to recognise that **tipping points can elicit a variety of emotional responses**. Certain aspects of tipping points are emphasised or interpreted differently **depending on how facts are framed**. This plays a key role in making tipping points more relatable to a wider audience and stimulating behavioural change. The existential nature of the tipping point phenomenon asks for **sensitive communication**.

The following section provides **research-based advice on approaching communicative efforts** surrounding the AMOC and other climate tipping points.

COMMUNICATION TOOLS

ASPECTS



TECHNIQUES



Purpose: Communicate the AMOC as a call for action by **increasing a sense of urgency** and **stimulating public discourse**.



Responsibility: Besides scientists, it is essential to **diversify the senders** and **appeal to social role models** (e.g. doctors) to increase credibility.



Medium: The medium should be adapted to the audience and the resources, but always try to include **interactive elements** and **provide space for the audience to discuss**.



Audience: Target decision-makers across sectors and aim for a **Climate-Engaged** or **Indecisive Audience**.



Techniques: Use tools to emphasise certain aspects of tipping points, relate to the audience, motivate climate action and stimulate **behavioural change**.



Framing / Personal Story: Frames and target-based narratives on **health gains, economic opportunities and moral obligations** can mobilise support for climate action.



Emotional Appeals: Since a potential AMOC collapse has existential implications, it is essential to **recognise, accept and show emotions** to increase the message's credibility. We advise to **steer clear of fear-mongering**.



Collective Efficacy Cues: Within a tipping point context, **collective efficacy – the feeling that we can make a change – is most important**. Focus on providing clear steps to make a collective difference (financial decisions, voting, organisational successes).



Consensus Messaging: **Stick to scientific consensus** when debating a potential AMOC collapse. Consult trustworthy sources, e.g. the Intergovernmental Panel on Climate Change (IPCC) report.



HOW CAN YOU GET INVOLVED?

SPOKESPERSON

Communicating and discussing the AMOC and other tipping points may prove challenging. Which evidence-based tips can you use to communicate the AMOC amongst your peers and wider network?

- ☐ Start discussing the AMOC within your personal and professional networks.
- ☐ Use the communication tools provided in this guide to communicate about the AMOC.
- ☐ Create interactive modes of communication and a space for discussion (e.g. workshops, use memes, ...).
- ☐ Provide emotional context when communicating and show empathy to your audience.
- ☐ Use your network of social role models to communicate tipping points and share success stories (e.g. economic and health co-benefits of a particular climate action, development of a heat adaptation plan).
- ☐ Refer to scientific consensus when communicating climate tipping points.
- ☐ Include a personal call for action.
- ☐ Share this AMOC Guide or an article about the AMOC via your preferred social media.

INTERESTED BYSTANDER

Tipping points are not widely understood by the public. How can you spread knowledge and raise awareness about the AMOC without in-depth knowledge or with limited time and resources?

- ☐ Read a news article or watch a video about the AMOC.
- ☐ Talk to one person about tipping points: Why is it relevant to you? How do climate mitigation and adaptation increase your and your family's health and reduce risk?
- ☐ Vote for people and parties in European, national and federal elections that prioritise climate action on their political agenda.
- ☐ **Advanced:** Follow research updates by subscribing to newsletters or follow reputable climate science institutions to stay up-to-date on AMOC and tipping points research (see resources at the end of this guide).

Personal tipp: Follow Stefan Rahmstorf.

ADVOCATE FOR POLICY CHANGE

Are you working for a civil society organisation or in the climate and health policy field? How can you use your influence to steer policy change in pro-climate directions that account for radical climatic events?

- ☐ Integrate all weather extremes (including cold weather), psychosocial health effects and threats of upcoming disease and disaster scenarios and respective adaptation measures into institutional adaptation and public emergency plans.
- ☐ Involve communities in creating emergency plans to reduce distress during crises. Offer training courses and scenario-based exercises to better prepare for emergencies.
- ☐ Support and provide funding for research projects, implementation of adaptation measures, psychosocial health initiatives and investments in preventive infrastructural and health measures.
- ☐ Support volunteer-based civil protection services and expand cross-border cooperation in disaster response while providing well-explained public information.

ADVOCATE FOR ORGANISATIONAL CHANGE

How will your organisation respond to the AMOC? How can you use your influence to spark a debate, further spread awareness and trigger creative solutions in your organisation?

- ☐ Discuss the AMOC in your organisation by including it in your weekly team meeting(s).
- ☐ Share positive stories: Are you a climate manager or involved in societal change? Share your story with your colleagues.
- ☐ Demand training for climate change and health: What do you need to know to act in disaster scenarios caused by tipping points?
- ☐ Think of action in your organisation: What can your hospital do? What can your organisation do to spread awareness about the health effects of the AMOC?
- ☐ Form advocacy coalitions with other organisations to increase public pressure and suggest recommendations for AMOC-related change.
- ☐ Include the AMOC and how it affects your organisation or clients in your organisation's newsletter.



Why focus on the AMOC when its collapse is uncertain? Aren't there more pressing issues?

The challenge lies in detecting the tipping process, making early action crucial. While the AMOC's collapse remains uncertain, its potential severe and irreversible impacts on Earth warrant proactive attention. Addressing it builds resilience to future risks and complements other urgent climate actions. Moreover, climate change, particularly disasters, threatens social and democratic stability, exacerbating existing problems.

Can we adapt to the AMOC or should we focus solely on mitigation?

Adaptation and mitigation are both essential and go hand-in-hand. We need adaptation to address climate impacts we are already experiencing today and mitigation to limit future risks. Together, they provide added health and well-being benefits.

How likely is the AMOC to collapse, and when?

The AMOC is weakening, but the timing and likelihood of collapse remain uncertain. Projections range from 2025 to 2095, while the IPCC states medium confidence it won't collapse before 2100. However, models may overestimate its stability, with data showing a 15% weakening since the mid-20th century.

RESOURCES

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