

Atlantic Meridional Overturning Current (AMOC)

What is the issue?

- Atlantic Meridional Overturning Current (AMOC) is thought to be slowing down for the last 15 years, which could have drastic consequences on global climate.
- A new study suggests that AMOC is getting help from the Indian Ocean.

What is an AMOC?

- Atlantic Meridional Overturning Current is the large system of ocean currents operating in the Atlantic Ocean.
- It circulates the waters between the north and the south.
- It ensures the oceans are continually mixed, and heat and energy are distributed around Earth.
- Warming as a result of climate change, the Indian Ocean is causing a series of cascading effects that is providing AMOC a “jump start”.

How AMOC works?

- As warm water flows northwards in the Atlantic, it cools, while the evaporation increases its salt content.
- Low temperature and high salt content raise the density of the water, causing it to sink deep into the ocean.
- The cold, dense water deep below slowly spreads southward.
- Eventually, it gets pulled back to the surface and warms again and, the circulation is complete.
- This continual mixing of the oceans, and distribution of heat and energy around the planet, contribute to global climate.
- Another oceanic system, which is more frequent, is the El Niño-Southern Oscillation (ENSO).
- This involves temperature changes of 1°-3°C in the central and eastern tropical Pacific Ocean, over periods between 3 and 7 years.
- **El Niño** refers to warming of the ocean surface and **La Niña** to cooling, while “Neutral” is between these extremes.
- This alternating pattern affects rainfall distribution in the tropics and can have a strong influence on weather in other parts of the world.

What is happening now?

- AMOC has been stable for thousands of years.
- Data since 2004 and projections are cause for concern.
- It is not clear whether the signs of slowing in AMOC are a result of global warming or only a short-term anomaly.
- Yale University research - AMOC had weakened substantially 17,000 to 15,000 years ago.
- The new study, by Fedorov and Shineng Hu of Scripps Institution of Oceanography, appears in Nature Climate Change.

What is Indian Ocean's role?

- Fedorov and Hu's work involves climate mechanisms that may be shifting due to global warming.
- Using observed data and computer modelling, they have plotted out what effect such shifts might have over time.
- In this study, they looked at warming in the Indian Ocean.
- **Their findings** - As the Indian Ocean warms faster and faster, it generates additional precipitation.
- This draws more air from other parts of the world to the Indian Ocean, including the Atlantic.
- With so much precipitation in the Indian Ocean, there will be less precipitation in the Atlantic Ocean.
- Less precipitation will lead to higher salinity in the waters of the tropical portion of the Atlantic.
- This saltier water in the Atlantic, as it comes north via AMOC, will get cold much quicker than usual and sink faster.
- This would act as a jump start for AMOC, intensifying the circulation.
- **Concern** - It is not know how long this enhanced Indian Ocean warming will continue.
- If other tropical oceans' warming, especially the Pacific, catches up with the Indian Ocean, the advantage for AMOC will stop.

Source: The Indian Express