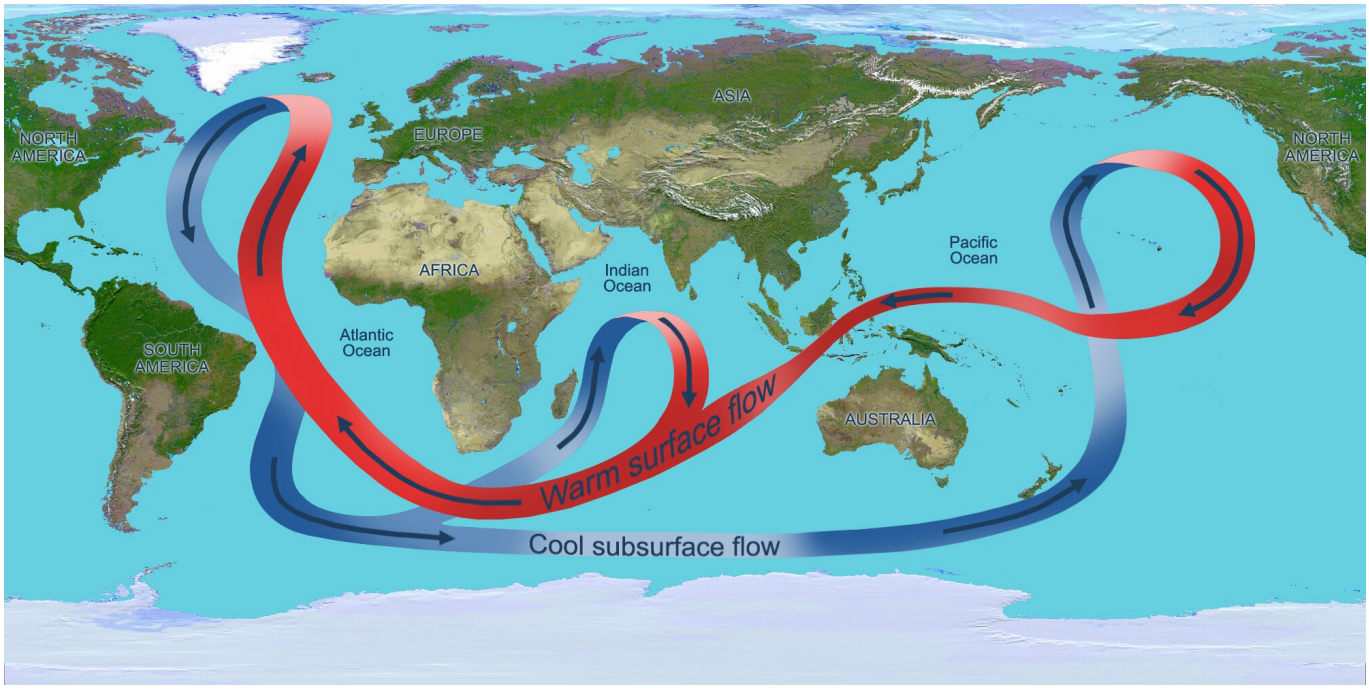
Climate Change and Ocean Currents

A new study suggests a **link** between **Atlantic Meridional Overturning Circulation (AMOC) and the Indian Ocean.**



- For thousands of years, Atlantic Meridional Overturning Circulation (AMOC) has remained stable but in the last 15 years, signs show that **AMOC may be slowing,** which could have drastic consequences on the global climate.

  However, the **rising temperatures in the Indian Ocean** can help **to boost the AMOC** and **delay slow down.**
- Warming in the Indian Ocean generates additional precipitation, which, in turn, draws more air from other parts of the world, including the Atlantic.
- With so much precipitation in the Indian Ocean, there will be less precipitation in the Atlantic Ocean.
- Lesser precipitation leads to higher salinity in the waters of the tropical portion of the Atlantic — because there won't be as much rainwater to dilute it.

- This saltier water in the Atlantic, as it comes north via AMOC, will get cold much quicker than usual and sink faster.
- The above process would act as a jump start for AMOC, intensifying the circulation.
- But if other tropical ocean's warming, especially the Pacific's, catches up with the Indian Ocean, the advantage of intensification for AMOC may stop.
- Moreover, it isn't clear whether the slowdown of AMOC is caused by global warming alone or it is a short-term anomaly related to natural ocean variability.
- Slow down of AMOC had taken place 15,000 to 17,000 years ago which caused harsh winters in Europe, with more storms or a drier Sahel in Africa due to the downward shift of the tropical rain belt.
- Alternating oceanic system patterns like ENSO also affects rainfall distribution in the tropics and can have a strong influence on weather in other parts of the world.

Atlantic Meridional Overturning Circulation (AMOC)

- Atlantic meridional overturning circulation (AMOC) — which is sometimes referred to as the **"Atlantic conveyor belt"** — is **one of the Earth's largest water circulation systems** where ocean currents move warm, salty water from the tropics to regions further north, such as western Europe and sends colder water south.
    - As warm water flows northwards in the Atlantic, it cools, while evaporation increases its salt content.
    - Low temperature and high salt content increases 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 the distribution of heat and energy around the planet contributes to the global climate.
- Atlantic Meridional Overturning Current (AMOC) **ensures the oceans are continually mixed, and heat and energy are distributed around Earth.**

El Niño-Southern Oscillation (ENSO)

- It involves temperature changes of 1°-3°C in the central and eastern tropical Pacific Ocean, over periods between three and seven years.
- El Niño refers to the warming of the ocean surface and La Niña to cooling, while "Neutral" is between these extremes.

Source: IE