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Thermohaline Circulation: The Global Conveyor Belt

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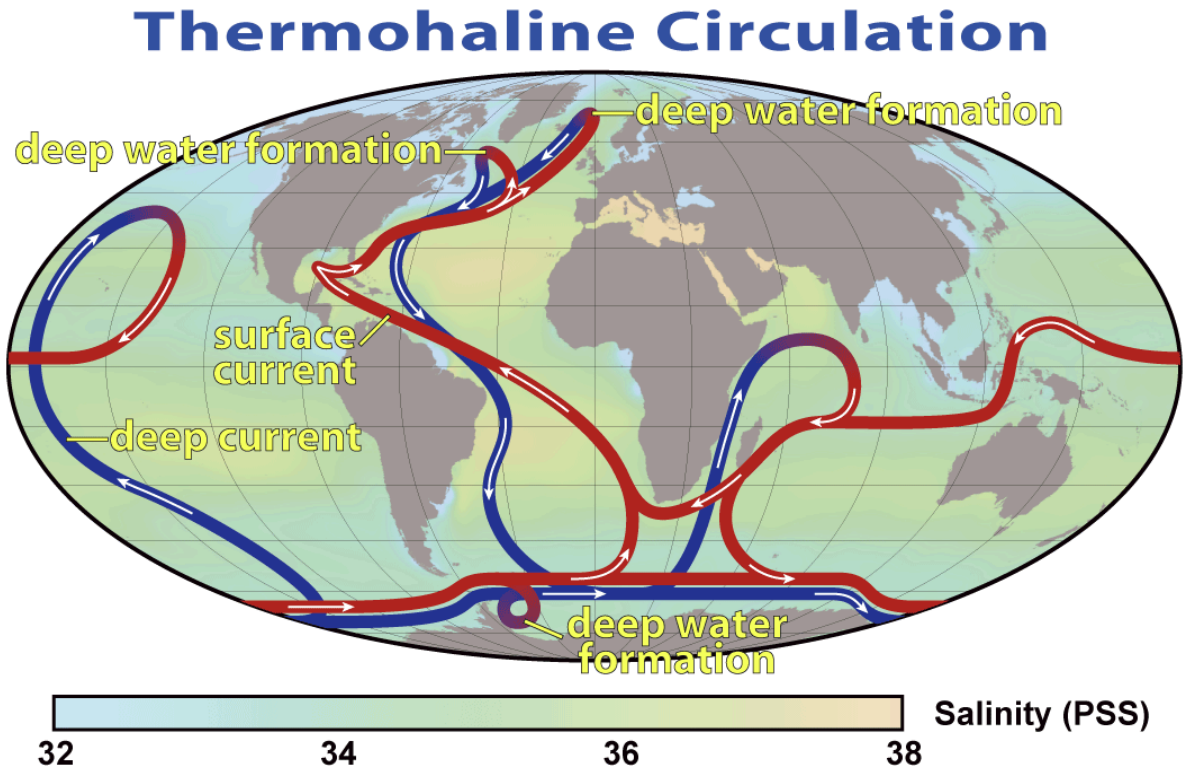

What is Thermohaline Circulation?

Thermohaline circulation, also known as the Global Conveyor Belt, is the large-scale movement of ocean water driven by differences in temperature (“thermo”) and salinity (“haline”). Together, these factors affect water density.

The process begins when the surface water in the North Atlantic becomes cold and salty due to sea ice formation. This cold, salty water, being very dense, sinks downward in the ocean and moves southward.

Warm surface water moves in to replace the sinking water. Surface currents, like the Gulf Stream, carry warm water from the tropics northward.

After sinking, the cold, dense water spreads throughout the global ocean. In some areas, like the Indian and Pacific Oceans, the deep water slowly rises back to the surface through upwelling as it gets warmer. The cycle can then be continued.

The Importance of Thermohaline Circulation

Thermohaline circulation is a critical process. It moves heat from the tropics to the polar regions, which moderates climate in regions like Europe.

The global circulation also involves upwelling, the process of bringing deep water to the surface. This deep water is often nutrient-rich, so its transport to the surface helps support marine life.

The global conveyor belt also helps stabilize long-term climate. Weakening to the circulation could cause massive and rapid shifts in climate.

The Future of the Global Conveyor Belt

In the present day, thermohaline circulation faces a major threat due to our rapidly changing climate. As ice melts in Greenland, freshwater is added to the North Atlantic, reducing its salinity. As a result, the water there is becoming less dense, and thermohaline circulation could slow down or even shut off completely in future years.

Why would this be an issue? Well, it would result in major changes, felt globally. Northern Europe would experience cooling, the tropics would become warmer, monsoons and rainfall patterns would shift, and eastern North America would experience coastal sea level rise.

References

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