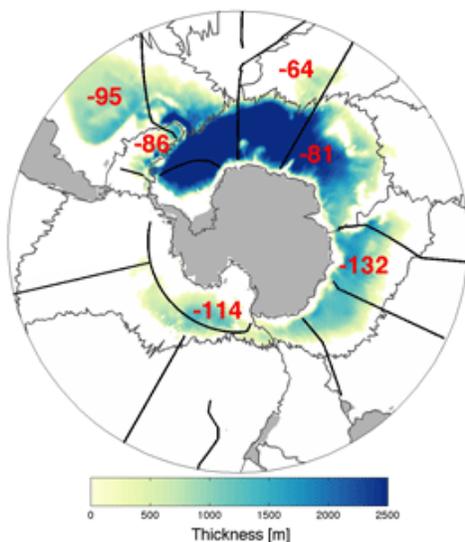




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What is happening to the oceans' coldest, deepest water?

Using data collected from 1980 to 2011, scientists have found a large reduction in the amount of the coldest deep ocean water, called Antarctic Bottom Water, around the Southern Ocean. The cause is unknown, but the researchers point out that the world's deep ocean currents play a critical role in transporting heat and carbon around the planet and regulating climate.



A layer of Antarctic Bottom Water colder than 0°C (thickest layer coloured darkest blue, and white areas have no layer) covers the ocean floor around Antarctica. Rates at which this layer is thinning during the study period (metres per decade in red) are shown for each deep basin (outlined by thin grey lines). The rates are estimated using data from repeated oceanographic voyages (tracks shown by thick black lines). Note seawater at the ocean surface stays liquid even at temperatures approaching -2°C because of its high salt content. Credit: NOAA

Two US oceanographers have found that the layer Antarctic Bottom Water has been disappearing at an average rate of eight million metric tons per second over the past few decades.

'Because of its high density, Antarctic Bottom Water fills most of the deep ocean basins around the world, but we found that the amount of this water has been decreasing at a surprisingly fast rate over the last few decades,' said lead author [Sarah Purkey from the University of Washington](#).

'In every oceanographic survey repeated around the Southern Ocean since about the 1980s, Antarctic Bottom Water has been shrinking at a similar mean rate, giving us confidence that this surprisingly large contraction is robust.'

Antarctic Bottom Water is formed in a few locations around Antarctica, where seawater is cooled by the overlying air and made saltier by ice formation. The dense water then sinks to the sea floor and spreads northward, filling most of the deep ocean around the world as it slowly mixes with warmer waters above it.

The world's deep ocean currents play a critical role in transporting heat and carbon around the planet, thus regulating our climate.

While previous studies have shown that the bottom water has been warming and freshening over the past few decades, these new results suggest that significantly less of this bottom water has been formed during that time than in previous decades.

Changes in the temperature, salinity, dissolved oxygen, and dissolved carbon dioxide of this prominent water mass have important ramifications for Earth's climate, including contributions to sea level rise and the rate of Earth's heat uptake.

'People often focus on fluctuations of currents in the North Atlantic Ocean as an indicator of climate change, but the Southern Ocean has undergone some very large changes over the past few decades and also plays a large role in shaping our climate,' said Johnson.

Source: NOAA

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