

22 August 2007 - "Ocean circulation noisy, not stalling", Quirin Schiermeier, Nature 448, 844-84, | doi:10.1038/448844b

No immediate danger for the Gulf stream.

Suggestions of a substantial decline in the Atlantic Ocean circulation that carries warm tropical water northwards seem to be largely unfounded. New data - recorded between the Bahamas and the Canary Islands - show that the seemingly dramatic reduction discovered two years ago in the strength of the Atlantic meridional overturning circulation (MOC) is easily within the range of huge seasonal variability.

In 2005, a team led by Harry Bryden, an oceanographer at the University of Southampton, UK, reported a 30% decrease in the MOC at 26.5° north, after comparing their measurements from ship-based instruments in 2004 with similar data from 1957, 1981, 1992 and 1998 (H. L. Bryden, H. R. Longworth and S. A. Cunningham Nature 438, 655-657; 2005). They did caution at the time that, due to the scarcity of observations, the error bounds of their study were exceptionally wide.

Nevertheless, the finding fuelled fears of an imminent collapse of the thermohaline Atlantic circulation - the ocean conveyor driven by temperature and salinity differences that gives rise to the Gulf Stream, allowing western Europe to enjoy a relatively mild climate.

Alarmist headlines warned that a mini ice age would hit Britain.

However, 12 months' worth of data from an array of moored instruments, deployed during the same 2004 cruise that yielded the most recent measurements included in Bryden's study, now suggest that the observed changes were due to short-term variability and not the result of global warming.

During just one year, Stuart Cunningham's team found enormous variability in the northwards flow of thermocline layer circulation (red), the deep waters of the upper (light blue), and the lower (dark blue) North Atlantic. Even the flow of intermediate water (green) fluctuated. AAAS

Stuart Cunningham of the National Oceanography Centre in Southampton and his colleagues found that the strength of the overturning circulation varied wildly - by a factor of 8 - between March 2004 and March 2005 (S. A. Cunningham et al. Science 317, 935-937; 2007). Bryden, who was also involved in the new study, had unknowingly probed the ocean during a period of relatively low circulation, they conclude.

"I guess we can give [thermohaline] the all-clear," says Jochem Marotzke, an oceanographer at the Max Planck Institute for Meteorology in Hamburg, Germany, formerly principal investigator of Rapid Climate Change (RAPID), a monitoring programme funded by the UK Natural Environment Research Council. The Atlantic sensor array, which is to remain operational until 2014, is part of the RAPID programme. Available data provide no statistically significant evidence for a change of the

overturning circulation over the past 50 years, says Marotzke, a co-author on the new study.

From now, the RAPID system should allow researchers to detect circulation changes from one year to the next, provided the average circulation volume changes by 20% or more. But because the unknown variability from year to year may also be large, it will take at least ten more years of continuous measurements until a possible downward trend will become recognizable in the data noise.

But Bryden remains unconvinced that the RAPID measurements in the new study have rendered his initial findings null and void. The depth of the thermocline - the layer of rapid heat transfer between the mixed-water layer at the surface and deep-ocean water - varies across the basin from west to mid-ocean, changing the recirculation of water. An increase in the slope of the thermocline along with the observed freshening of deep water near the Bahamas, do indicate a 10-15% decline in average circulation since 1980, Bryden maintains".

RAPID is quite an achievement," Bryden says. "But I don't share the opinion that our previous results are just due to seasonal variability. It may not be statistically reliable, but all the science points to a slow down of the Atlantic circulation.