No evidence of polar warming during penultimate interglacial

July 18 2012

The Atlantic Meridional Overturning Circulation (AMOC), driven by temperature and salinity gradients, is an important component of the climate system; it transfers an enormous amount of heat via ocean currents and atmospheric circulation to high northern latitudes and hence has bearing on climate in the region.

Freshening of the surface ocean could weaken the AMOC. But during warm interglacial periods the effect of a fresh surface ocean on the AMOC may be muted. In fact, climate models predict that heat transfer from the North Atlantic to the Arctic may increase over the 21st century. A series of interconnected processes in the North Atlantic, known as polar amplification, could cause the Arctic to warm up faster compared to the rest of the world. It could even lead to ice-free conditions in the Arctic.

Previous paleoclimatic reconstructions indicate that the sub-Arctic may have been warmer by about 5 degrees Celcius (9 degrees Fahrenheit) with little summer sea ice cover during the Eemian, the penultimate interglacial centered around 125,000 years ago. Climate models favoring polar amplification use the Eemian as an analog of the present. In a new study, Bauch et al. compare reconstructed temperatures and water masses from two sediment cores that record the flow of meltwater in the subpolar and polar North Atlantic over the past 135,000 years. They do not find evidence of extreme warmth in the sub-Arctic during the Eemian interglacial period.

In fact, the Arctic may have been colder during the Eemian, with lower heat transfer from the North Atlantic. On the basis of their finding, the authors suggest that previous records may reflect other phenomena and caution against the use of the Eemian as an analog of the present. Their finding also challenges climate models that predict extreme warmth and ice-free conditions in the Arctic in response to greenhouse gas warming in the 21st century.

More information: Contrasting ocean changes between the subpolar and polar North Atlantic during the past 135 ka, *Geophysical Research Letters*, doi:10.1029/2012GL051800, 2012

Provided by American Geophysical Union