Loss of Antarctic ice could trigger super-interglacial

- 19:00 21 June 2012 by **Michael Marshall**
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At least eight times in the last 2.8 million years, the Arctic experienced super-interglacials – periods in which summers there were 5 °C warmer than they are today.

Climate models cannot explain these unusually warm spells, but there could be an unexpected cause: the collapse of the West Antarctic ice sheet (WAIS), on the other side of the planet. The sheet could collapse again as the world warms, perhaps heralding super-interglacial number nine.

The evidence for the super-interglacials comes from a sediment core drilled from the bed of Lake El'gygytgyn in north-east Russia by Martin Melles of the University of Köln in Germany, and his colleagues.

Toasty warm

The Arctic ice sheets have been advancing and retreating for the last 2.6 million years, as temperatures fell and rose. Warmer periods – including the one we now live in – are known as interglacials. The Lake El'gygytgyn core confirms that Arctic temperatures during eight of these periods were on average 4 to 5 °C warmer than in the region today. "That's really a lot," says Melles.

What triggered these super-interglacials? Earlier studies hinting that they occurred encouraged Paul Valdes at the University of Bristol, UK, to try to find out. Last year he discovered that standard climate models couldn't simulate them (*Journal of Quaternary Science*, DOI: 10.1002/jqs.1525).

Melles ran into the same problem. He used a state-of-the-art climate model that included key positive feedbacks, such as vegetation moving north and thus absorbing more heat. But he could not trigger a super-interglacial in his simulations.

He turned to sediment records from Antarctica for further clues. These records suggest that the WAIS disintegrated during each of the super-interglacials.

All around the world

Despite being half a world away, the collapse of the ice sheet might be the trigger for an Arctic super-interglacial, says Melles. As the WAIS disintegrates, it would raise global sea levels by about 5 metres. This would push more warm water from the Pacific Ocean through the Bering Strait into the Arctic Ocean, warming the Arctic region.

Valdes agrees such a process could well be important, particularly as it was not included in the models he studied last year. So a collapsing WAIS would not just drive up sea levels, it might also heat up the Arctic. The $64,000 question is, will it collapse again in the near future?

"What we see today is a dramatic decrease of the WAIS," Melles says. Some scientists think it

will start to break up this century. But Melles says it could be centuries before the whole thing goes, and the effects would then take time to reach the Arctic.

"I don't think we know what it will take to lose the WAIS," says Valdes, "but if it goes, it would have climate consequences for the whole globe."

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