CLIMATE CHANGE

Both of the World's Ice Sheets May Be Shrinking Faster and Faster

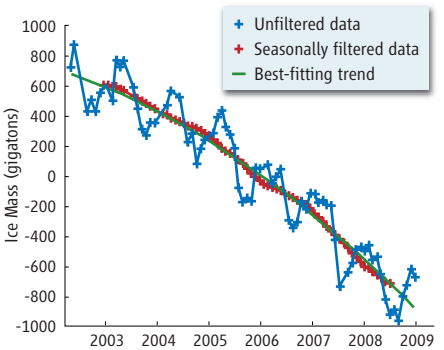
The two great ice sheets—Greenland's and Antarctica's—have had plenty of press lately, what with galloping glaciers and whole lakes of meltwater plunging into ice holes in minutes (*Science*, 18 April 2008, p. 301). Surveys of ice-sheet volume made from planes and satellites have quantified these losses, but those assessments have been spotty in time, space, or both. Shrinkage accelerated from the 1990s into the 2000s, but researchers couldn't be sure what would come next.

Now the latest analysis of the most comprehensive, essentially continuous monitoring of the ice sheets shows that the losses have not eased in the past few years. More ominously, losses from both Greenland and Antarctica appear to have accelerated during the past 7 years. If the acceleration out of the 1990s "was a hiccup, it was a big one, and it's getting bigger," says glaciologist Richard Alley of Pennsylvania State University, University Park, who was not involved in the work.

The results, in press at *Geophysical Research Letters*, are based on measurements by the Gravity Recovery and Climate Experiment (GRACE) satellite mission. Rather than measuring the volume of ice sheets every few years as most earlier surveys did, GRACE "weighs" them from month to month with a pair of spacecraft launched in March 2002 as a joint NASA and German Aerospace Center mission (*Science*, 14 August, p. 798). Flying in tandem 220 kilometers apart, the satellites can measure subtle variations in the pull of gravity as they pass over a large mass on the surface. By beaming microwaves from one to the other, they precisely gauge the changing distance between them as the added mass tugs first on the leading satellite and then on the trailing one. Changes in gravity from pass to pass reflect changes in the icy mass below.

The mass changes of Greenland and Antarctica during the past 7 years have all been negative, geophysicist Isabella Velicogna of NASA's Jet Propulsion Laboratory in Pasadena, California, concludes in the study. On Greenland, she calculates, the rate of ice mass loss doubled over the 7-year period, producing an acceleration of –30 cubic kilometers of water lost per year. On Antarctica, the loss rate more than doubled to produce a similar acceleration. Together, that would make for a 5% acceleration each year in the rise of sea level. Compounded year after year, "that is a big thing," says Velicogna. "We should be more concerned."

GREENLAND ICE MASS



Bending down. The trend line of Greenland ice mass (green) curves downward with time, suggesting that losses have been accelerating.

The GRACE observations counter encouraging news from southeastern Greenland that the surging glaciers there had slowed (*Science*, 23 January, p. 458). The slowing was probably real, says Alley, but apparently the increasing losses from melting and accelerating glaciers elsewhere around Greenland at least made up for the slowing in the southeast. Whatever is driving ice loss—warmer oceans, warmer air, or both—is persisting, he says.

Glaciologist Waleed Abdalati of the University of Colorado, Boulder, says Velicogna's analysis "suggests—that's the key word—that there's been an acceleration in the period examined. We have to be careful to not overinterpret and speculate about the future." The record is too short to be extrapolated into the future, Abdalati says. And at least in Greenland, it was affected by the extreme warmth and resulting melting in 2007, a loss surge that might not be repeated in the next 7 years.

If bursts of ice loss do occur soon, GRACE may not be around to record it. Its two satellites will fall from orbit around 2013, dragged down after a decade of orbiting through Earth's outermost atmosphere. No replacement gravity mission is yet planned.

–RICHARD A. KERR

CREDIT: ADAPTED FROM ISABELLA VELICOGNA, *GEOPHYSICAL RESEARCH LETTERS*

*Science*Insider

From the *Science* Policy Blog

Scientists complain that the U.S. Army's claims of success with an **AIDS vaccine** tested in Thailand are undermined by an unrevealed second analysis. That result found a drop in vaccine efficacy and no statistical significance when it compared vaccinated and control groups that rigorously followed the protocol. http://bit.ly/lHVr8

A number of scientists are outraged over **a new program to use DNA and tissue samples** to determine the nationality of applicants for asylum by the U.K. Border Agency. After *Science*Insider revealed scientific condemnation of its plans to conduct DNA tests and isotope analyses to determine nationality (*Science*, 2 October, p. 30), the U.K. Border Agency this week changed its plans, saying such evidence would not yet be used in asylum decisions. http://bit.ly/2QxWBG

Energy Secretary Steven Chu tried to persuade Congress to fund eight **Energy Innovation Hubs** next year, but in a spending bill passed last week, Congress supported only three. http://bit.ly/2GPoDK

A controversy at the ***Proceedings of the National Academy of Sciences*** over the journal's standards for **peer review** took a new turn when it decided to postpone the publication of a controversial paper on butterflies that was already accepted and published online. http://bit.ly/zhJsk

A new study conducted by the National Football League suggested that playing professional American football increases the risk of **dementia**, increasing pressure on the sport to study the problem. http://bit.ly/wO8cd

Congress has given the U.S. Department of Energy's **Office of Science** a 2.7% boost in its 2010 budget, to $4.9 billion. The $131 million increase comes as the overall budget for the $27 billion agency was held relatively flat. http://bit.ly/fQLdN

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