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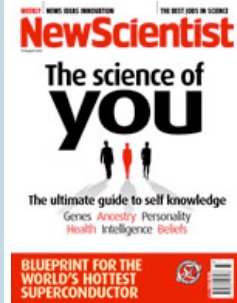
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### Greenland ice cap may be melting at triple speed

19:00 10 August 2006  
NewScientist.com news service  
Kelly Young

The world's second largest ice cap may be melting three times faster than indicated by previous measurements, according to newly released gravity data collected by satellites.

The Greenland Ice Sheet shrank at a rate of about 239 cubic kilometres per year from April 2002 to November 2005, a team from the University of Texas at Austin, US, found. In the last 18 months of the measurements, ice melting has appeared to accelerate, particularly in southeastern Greenland.

"This is a good study which confirms that indeed the Greenland ice sheet is losing a large amount of mass and that the mass loss is increasing with time," says Eric Rignot, from NASA's Jet Propulsion Laboratory in Pasadena, California, US, who led a separate study that reached a similar conclusion earlier in 2006 (See [Greenland's glaciers are speeding to the ocean](#)). His team used satellites to measure the velocity of glacier movement and calculate net ice loss.

Yet another technique, which uses a laser to measure the altitude of the surface, determined that the ice sheet was losing about 80 cubic kilometres of ice annually between 1997 and 2003. The newer measurements suggest the ice loss is three times that.

"Acceleration of ice mass loss over Greenland, if confirmed, would be consistent with proposed increased global warming in recent years, and would indicate additional polar ice sheet contributions to global sea level rise," write the University of Texas researchers in the journal *Science*.

### Identical twins

The satellites that provided the new data are results the Gravity Recovery and Climate Experiment (GRACE) pair. These identical US and German satellites fly 220 kilometres from one another. They use a microwave ranging system and Global Positioning System to measure precisely the distance between one another. Tiny changes in that distance reflect changes in the Earth's gravity field, which in turn is a measure of the density of part of the Earth.

"The gravity data are spectacular in providing precise information about what is happening to the ice sheets," says NASA climatologist James Hansen, director of the Goddard Institute for Space Studies in New York, US. "They provide the net effect of mass change, due to both melting and snowfall changes. It confirms our expectation that the warming climate will cause Greenland ice to shrink."

Based on the glaciology of the region, Rignot says he does not think that the north-eastern part of Greenland's ice cap has lost as much ice as the Texas team suggests - 74 cubic kilometres annually.

Other factors could account for the discrepancy, acknowledges Clark Wilson, one of the University of Texas team. For instance, scientists do not fully understand the ocean tides in the Arctic Ocean, and there are not a lot of weather stations to monitor air pressure there. GRACE only measures changes in gravity due to changing mass - it cannot tell if that results from changes in air, water, rock or ice.

So to find changes due to ice loss alone, the researchers have to subtract the estimated contribution of water and air. If that is not well known, it results in higher uncertainties in the interpretation.

"We're hoping as time goes on, we'll have improved tide

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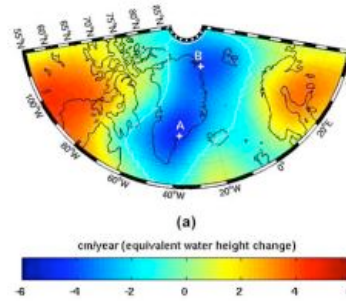
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Satellite gravity measurements give estimates of the loss of mass over Greenland and surrounding regions between April 2002 to November 2005 (Image: Jianli Chen)

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models, improved atmospheric pressure estimates and also better ways to use the GRACE data themselves," Wilson told **New Scientist**.

### Thwarted plans

The Greenland Ice Sheet holds about 2.85 million cubic kilometres of ice - 10% of the world's ice mass. If it all melted, it would raise the average sea level about 6.5 metres.

This is not GRACE's first measurement of an ice sheet. Another team at the University of Colorado, Boulder, US, similarly used the GRACE system to show that the Antarctic ice sheet was losing about 152 cubic kilometres annually from 2002 to 2005 (See [Gravity reveals shrinking Antarctic ice](#)).

"We should be making plans for the next generation of gravity satellites, but with the cutback in NASA funding for Earth science, this is not happening," says Hansen, who earlier in 2006 accused officials at NASA headquarters of trying to stop him from speaking out on greenhouse gas emissions (See [Top climatologist accuses US of trying to gag him](#)).

Journal reference: *Science* (DOI:10.1126/science.1129007)



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