

## Greenland ice sheet slams the brakes on

- \* 19:00 03 July 2008
- \* NewScientist.com news service
- \* Michael Reilly

Much noise has been made about how water lubricates the base of Greenland's ice sheet, accelerating its slide into the oceans. In a rare "good news" announcement, climatologists now say the ice may not be in such a hurry to throw itself into the water after all. Mother Nature, it seems, has given it brakes.

Since 1991, the western edge of Greenland's ice sheet has actually slowed its ocean-bound progress by 10%, say the team, who have studied the longest available record of ice and water flow in the region.

Greenland's mighty ice sheet has enough water locked away to raise global sea level 6.5 metres were it to melt. Each summer, vast lakes of meltwater form on its surface. The water seeps through cracks in the kilometer-thick ice to bedrock, where it acts as a lubricant. The sheet can move up to twice as fast in the summer, when meltwater is flowing, as when it is not.

Many fear a positive feedback loop, whereby the accelerating flow will bring more ice down out of the mountains and toward warmer temperatures near sea level. Roderik Van De Waal and colleagues at Utrecht University in the Netherlands now say there is no evidence this will happen.

Daily changes

They looked at how meltwater has correlated with the speed of ice flow at the western edge of the sheet, just north of the Arctic Circle, since 1991. They found that meltwater pouring down holes in the ice – called "moulins" – did indeed cause ice velocities to skyrocket, from their typical 100m per year to up to 400m per year, within days or weeks.

But the acceleration was short-lived, and ice velocities usually returned to normal within a week after the waters began draining. Over the course of the 17 years, the flow of the ice sheet actually decreased slightly, in some parts by as much as 10%.

"For some time, glaciologists believed that more meltwater equaled higher ice speeds," Van de Waal says. "This would be kind of disastrous, but apparently it is not happening."

Van de Waal believes that the channels that carry the meltwater out to sea freeze up during the winter months. In summer, pulses of water rushing down the moulins to the bedrock overwhelm the narrowed channels, and the increased pressure lifts the ice sheet off the rock, enabling it to move faster.

However, after a few days the channels are forced open by the water, and it drains away from the glacier. As a result, the ice grinds back down against the bedrock and the lubricant effect is lost.

No lubrication

Van De Waal says this indicates that, overall, meltwater has a negligible effect on the rate at which the ice sheet moves.

Not all scientists agree. Jay Zwally of NASA's Goddard Space Flight Center in Greenbelt, Maryland, US, says that averaging data over the last 17 years does not make sense because the most rapid melting at the edges of the ice sheet did not start until recently.

"It's only in the last five years or so that the warming signal has really been visible," he says.

Zwally told New Scientist that unpublished data from the eastern edge of the ice sheet suggests between 3% and 5% more ice is being lost because of lubrication than would otherwise happen. That is less than the 25% that was previously calculated, but still significant, he says.

Journal reference: Science, vol 321 p 111