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Greenland glacier races to ocean

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Kangerdlugssuaq is 7km wide, 30km long and 1km deep

Scientists have been monitoring what they say may be the fastest moving glacier on the planet.

Kangerdlugssuaq Glacier on the east coast of Greenland has been clocked using GPS equipment and satellites to be flowing at a rate of 14km per year.

It is also losing mass extremely fast, with its front end retreating 5km back up its fjord this year alone.

The glacier "drains" about 4% of the ice sheet, dumping tens of cubic km of fresh water in the North Atlantic.

This gives it significant influence not just on global sea level rise but on the system of ocean circulation which drives through the Arctic.

"We've seen a 5km retreat of the terminus, we've see an almost 300% acceleration in the flow speed and we've seen about a 100m thinning of the glacier - all occurring in the last one or so years," said Dr Gordon Hamilton, of the Climate Change Institute at the University of Maine.

"These are very dramatic changes." And they are not confined to Kangerdlugssuaq.

He was speaking here at the American Geophysical Union Fall Meeting.

Model problem

Helheim Glacier, just to the south of Kangerdlugssuaq, is exhibiting similar changed behaviour. It is flowing only slightly slower at 12km per year - the equivalent of half a football field a day.

Hamilton thinks a couple of factors may be triggering the quick melt.

GPS is used to measure the flow rate

The observed recent increase in summer surface melting on the Greenland Ice Sheet is producing large quantities of liquid water which, if it percolates down to the base of the glacier, can lubricate its flow over rocks towards the ocean.

And if that same warming is bringing higher-temperature sea waters into contact with the front of Kangerdlugssuaq and Helheim, this could explain their rapid retreat.

If other large glaciers in the region are seen to go the same way, it could begin to "pull the plug" on Greenland, said Dr Hamilton.

"The model predictions for sea level rise do not include the effects of rapid changes in ice dynamics," he added.

"We're seeing now that this component might be extremely important. And what it suggests is that the predictions for both the rate and the timing for sea level rise in the next few decades will be largely underestimated."

Alaskan lessons

Tad Pfeffer, from the University of Colorado at Boulder, also gave the latest details here of his study of Alaska's Columbia

Glacier.

This has shrunk in length by more than 14km since 1980 and is moving at a speed just shy of Kangerdlugssuaq.

The Columbia Glacier is now the single largest glacial contributor in North America to sea level rise, producing about 10% of the water volume entering the sea from all Alaskan glaciers each year.

Dr Pfeffer said its current retreat, which started in 1980, appears to be linked to a combination of complex physical processes which cannot be explained simply by recent climate warming.

"Tidewater glaciers advance and retreat in a fairly well documented cycle in Alaska. They advance slowly over millennia and they retreat rapidly over a few decades," Dr Pfeffer said.

The longer and more detailed records of Columbia could be used as a model to better understand the current behaviour of glaciers in Greenland, Dr Pfeffer added.

"If we are going to put things into a numerical model and try to figure out contributions to global sea levels from these processes, we have to have a pretty good way of looking at the physics and Columbia is an excellent place to do that," he told the meeting.