



Support units: Language of geography

Illustration 1: Teaching literacy in geography – Year 8

Greenland melts before NASA's eyes

Scientists are tracking the effects of an unusual 'heat dome' across the Arctic region, writes Ben Cubby.

The Greenland ice sheet is melting at an 'unprecedented' rate, according to NASA satellite data that shows 97 per cent of the vast mass is undergoing some form of melting.

"This was so extraordinary that at first I questioned the result: Was this real or was it due to a data error?" a NASA researcher, Son Nghiem, said.

About half of the ice sheet usually shows signs of melting in a northern hemisphere summer, but the satellite data shows that between July 8 and July 12 the melt extended to cover almost all of Greenland.

It follows the breaking off this month of a giant chunk of ice from Greenland's Petermann Glacier. This formed an iceberg about twice the size of Manhattan, about 120 square kilometres in area.

"For several days this month, Greenland's surface ice cover melted over a larger area than at any time in more than 30 years of satellite observations," NASA researchers said in a statement.

"Nearly the entire ice cover of Greenland, from its thin, low-lying coastal edges to its two-mile [3.2-kilometre] thick centre, experienced some degree of melting at its surface, according to measurements from three independent satellites analysed by NASA and university scientists."

They described the event as being without precedent, because such a massive loss of ice has not been observed by humans, although estimates derived from studying old, compressed ice suggest that melts on this scale happen about once every 150 years.

"Researchers have not yet determined whether this extensive melt event will affect the overall volume of ice loss this summer and contribute to sea-level rise," NASA said. "About one-fifth of the annual sea-level rise experienced globally is attributed to the melting of the ice sheet."

The manager of Australia's climate monitoring section at the Bureau of Meteorology, Karl Braganza, said the observation was a disturbing development.

"In terms of just one event taken in isolation, you can't tell much from it. We had a similar event back in the 1800s so it does happen from time to time," Dr Braganza said.

"But clearly there is a trend going on in the Arctic this century. We have warmer ocean temperatures, now what looks like particularly large reductions in sea ice, and large chunks of glaciers breaking off."

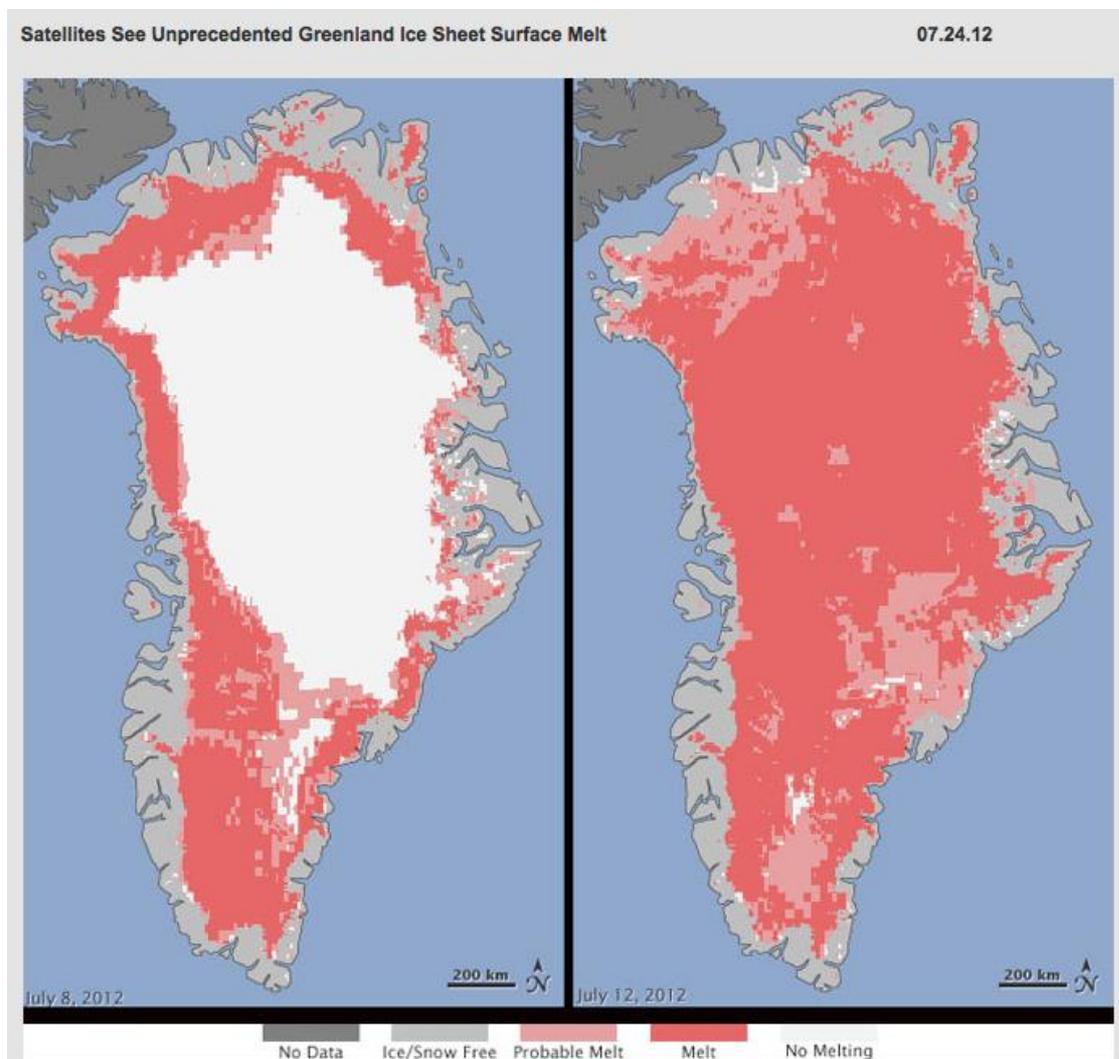
The Arctic appeared to be locked in a vicious cycle, where rising concentrations of greenhouse gases meant higher temperatures, and more melting ice, which meant, in turn, that less of the sun's incoming heat was reflected away from the Earth.

"What's alarming to scientists is that we know the Arctic ice is a key feedback, and the warming in the Arctic has been slightly faster than was predicted 10 or 20 years ago," Dr Braganza said.

"This year, we measured CO₂ emissions in the Arctic at above 400 parts per million for the first time. That's the first time it's been at that level in 3 million years. Back then, during the Pliocene period, the Greenland ice sheet wasn't a feature. Now we've taken the atmospheric chemistry back to that territory."

The NASA statement said the huge melt had been driven by an unusual "heat dome" of relatively warm air that travelled across Greenland this month. The warm patch spiked just before July 18, and has now dissipated, they said.

Ben Cubby, *Sydney Morning Herald*, 26 July 2012, p. 9.



Source: NASA. *Earth. Your future; our mission*. Retrieved August 2013, from: <http://www.nasa.gov/topics/earth/features/greenland-melt.html>

Thaw point: Satellite images show Greenland's ice sheet on 8 July, left, when about 40 per cent had undergone thawing at or near the surface; and on 12 July, right, when an estimated 97 per cent of the ice sheet surface had thawed.



Source: NASA. *Petermann Glacier*. Retrieved August 2013, from:
http://www.nasa.gov/multimedia/imagegallery/image_feature_2310.html.

Cold facts: Petermann Glacier shed a massive iceberg in July.