Previous rapid thinning of Pine Island Glacier sheds light on future Antarctic ice loss

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Sample from Maish Nunatak, Antarctica. Credit: James Smith, British Antarctic Survey

New research, published this week in *Science*, suggests that the largest single contributor to global sea level rise, a glacier of the West Antarctic Ice Sheet, may continue thinning for decades to come. Geologists from the UK, USA and Germany found that Pine Island Glacier (PIG), which

is rapidly accelerating, thinning and retreating, has thinned rapidly before. The team say their findings demonstrate the potential for current ice loss to continue for several decades yet.

Their findings reveal that 8000 years ago the glacier thinned as fast as it has in recent decades, providing an important model for its future behaviour. The glacier is currently experiencing significant acceleration, thinning and retreat that is thought to be caused by 'ocean-driven' melting; an increase in warm ocean water finding its way under the ice shelf.

After two decades of rapid ice loss, concerns are arising over how much more ice will be lost to the ocean in the future. Model projections of the future of PIG contain large uncertainties, leaving questions about the rate, timing and persistence of future sea level rise. Rocks exposed by retreating or thinning glaciers provide evidence of past ice sheet change, which helps scientists to predict possible future change. The geologists used highly sensitive dating techniques, pioneered by one of the team, to track the thinning of PIG through time, and to show that the past thinning lasted for several decades.

Lead author Joanne Johnson from the British Antarctic Survey (BAS) said:

"Our geological data show us the history of Pine Island Glacier in greater detail than ever before. The fact that it thinned so rapidly in the past demonstrates how sensitive it is to environmental change; small changes can produce dramatic and long-lasting results. Based on what we know, we can expect the rapid ice loss to continue for a long time yet, especially if ocean-driven melting of the ice shelf in front of Pine Island Glacier continues at current rates,"

Professor Mike Bentley, a co-leader of the project based at Durham

University said:

"This paper is part of a wide range of international scientific efforts to understand the behaviour of this important glacier. The results we're publishing are the product of long days spent sampling rocks from mountains in Antarctica, coupled to some exceptionally precise and time-consuming laboratory analyses. The results are clear in showing a remarkably abrupt thinning of the glacier 8000 years ago".

More information: Rapid thinning of Pine Island Glacier in the early Holocene by J. S. Johnson, M. J. Bentley, J. A. Smith, R. C. Finkel, D. H. Rood, K. Gohl, G. Balco, R. D. Larter, J. M. Schaefer is published in *Science* on Thursday 20 February 2014.
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