

The riddle of the North-East Greenland Ice Stream; simulations testing if a large ancient volcanic area, under 3 km of ice, triggers the greatest flow of ice on Greenland

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In order to correctly predict global sea level rise we need to be able to predict how the Greenland ice sheet will be affected by climate change. A prerequisite for this is to reproduce the recent state of the ice sheet adequately. While simulations have produced encouraging results, there is a notable discrepancy between simulated and observed present-day surface velocities of the ice sheet for the North-East Greenland Ice Stream (NEGIS). NEGIS is a long ice stream that begins in the central region of the ice sheet and stretches to the north east coast. Ice cores and radar studies have suggested that a geothermal anomaly associated with an ancient volcanic area exists under NEGIS and is responsible for its anomalous behaviour as the warm rock melts and lubricates the base of the ice.

We present preliminary results for simulations with the ice sheet model SICOPOLIS that include a geothermal warm anomaly under the ice sheet in the proposed volcanic region. Results so far show how the geothermal anomaly can form an area of basal meltwater that spreads to the coast following the path of NEGIS. Lubrication from this water increases the movement of basal ice towards the coast and so raises the possibility that the hot spot contributes to the formation of NEGIS. If this can be confirmed a significant problem in Greenland ice sheet modeling could potentially be alleviated. We continue to test different configurations and will present the latest results and implications at the conference.

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