# Melting of Northern Greenland during the last interglacial

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The Greenland ice sheet (GrIS) is losing mass at an increasing rate, making it the primary contributor to global eustatic sea level rise. Large melting areas and rapid thinning at its margins has raised concerns about its stability. However, it is conceivable that these observations represent the transient adjustment of the fastest reacting parts of the ice sheet, masking slower processes that dominate the long term fate of the GrIS and its contribution to sea level rise.

Using simulated climate data from the comprehensive coupled climate model IPSL CM4, we simulate the GrIS during the Eemian interglaciation with the three-dimensional ice sheet model SICOPOLIS. The Eemian is a period 126,000 years before present (126 ka) with Arctic temperatures comparable to projections for the end of this century. In our simulation, the northeastern part of the GrIS is unstable and retreats significantly, despite moderate melt rates. This result is found to be robust to perturbations within a wide parameter space of key parameters of the ice sheet model, the choice of initial ice temperature, and has been reproduced with climate forcing from a second coupled climate model, the CCSM3. It is shown that the northeast GrIS is the most vulnerable. Even a small increase in melt removes many years of ice accumulation, giving a large mass imbalance and triggering the strong ice- elevation feedback. Unlike the south and west, melting in the northeast is not compensated by high accumulation. The analogy with modern warming suggests that in coming decades, positive feedbacks could increase the rate of mass loss of the northeastern GrIS, exceeding the recent observed melt in the south.