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Modelling surface mass balance on Greenland in Eemian, glacial inception and modern climate

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Changing climate conditions on Greenland influence the accumulation rates on the ice sheet and, ultimately, its shape. We use an advanced snow model integrated into a state of the art general circulation model (GCM) to analyze accumulation and mass balance under insolation and oceanic boundary conditions for present day, at glacial inception (115ky BP) and during the Eemian (126ky BP).
Present-day mass balance is in reasonable agreement with recent regional model findings, it is affected by a moist bias in the GCM in western Greenland and a warm bias in the north-east. It turns out that under Eemian conditions, the mass balance is more negative in particular in the north, but more positive towards the western and south-eastern coasts, except for the southern tip. Melting appears to affect even areas at high altitude such as the recent ice core drilling site of NEEM where ice from that period was reached. In contrast, under glacial inception conditions, we find a somewhat higher mass balance overall, indicating that reduced melting and drying effects of the colder climate largely compensate.
We compare our results to mass balance estimates based on the positive degree days method commonly used in ice sheet models and find these to underestimate the mass balance for the northern part of the ice sheet in particular at 126k.