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A new multiple spatial resolution estimate of the bedrock elevation of the Greenland ice sheet.

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Gridded bedrock elevation for the Greenland ice sheet has previously been determined with 5 km postings. The true resolution of the data set was, in places, however, considerably coarser than this due to the across-track spacing of flight lines. Errors were estimated to be on the order of a few percent in the centre of the ice sheet but increasing markedly in relative magnitude near the margins, where, for numerical modelling, accurate thickness is particularly critical. We use new airborne and satellite estimates of ice thickness and surface elevation to determine the bed topography for the whole of Greenland. In particular, the University of Kansas have in recent years, flown an airborne ice-penetrating radar system with close flightline spacing over several key outlet glacier systems. This allows us to produce a multi-resolution bedrock elevation dataset with the high spatial resolution needed for ice dynamic modelling over these key outlet glaciers and coarser resolution over the more sparsely sampled interior.

Airborne ice thickness and elevation from CReSIS obtained between 1993 and 2009 are combined with JPL, DONNEES data covering the marginal areas along the south west coast from 2009. Data collected in the 1970's by the Technical University of Denmark were also used in interior areas with sparse coverage from other sources. Marginal elevation data from the ICESat laser altimeter were used to help constrain the ice thickness and bed topography close to the ice sheet margin where, typically, the terrestrial observations have poor sampling between flight tracks.