

Geomorphological evidence of channelized subglacial meltwater drainage under the Scandinavian Ice Sheet

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The impact of subglacial meltwater erosion on shaping glacial landscapes is contentious and often difficult to constrain due to the lack of unequivocal diagnostic criteria. The same holds for the role of subglacial meltwater in glacier movement processes and sediment transport and deposition.

Here we present new evidence of widespread channelized erosion under the southern, soft-bedded fringe of the last Scandinavian Ice Sheet (SIS) based on high-resolution terrain analysis with LiDAR imagery. We identify several tens of sites with “glacial curvilineation” landscapes first recognized by Lesemann et al. (2010, 2014) and considered as evidence of erosion by turbulent meltwater flows at the ice/bed interface.

The “glacial curvilineation” landscapes mapped here consist of sets of parallel, winding ridges typically several metres high and up to several kilometres long occupying glacial overdeepenings and tunnel valleys. The ridges are aligned approximately perpendicular to the past ice sheet margins and they are composed of various deposits often pre-dating the last ice advance. We interpret them as erosional remnants of older landscapes dissected by high-energy subglacial meltwater flows. These findings suggest that the palaeoglaciological significance of meltwater drainage under the southern portion of SIS may have been grossly underestimated.

References

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