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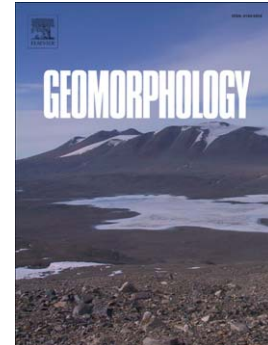
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Geomorphological investigation of multiphase glacitectonic composite ridge systems in Svalbard

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Abstract

Some surge-type glaciers on the High-Arctic archipelago of Svalbard have large glacitectonic composite ridge systems at their terrestrial margins. These have formed by rapid glacier advance into proglacial sediments during the active surge phase, creating multicrested moraine complexes. Such complexes can be formed during single surge advances or multiple surges to successively less-extensive positions. The few existing studies of composite ridge systems have relied on detailed information on internal structure and sedimentology to reconstruct their formation and links to surge processes. However, natural exposures of internal structure are commonly unavailable, and the creation of artificial exposures is often problematic in fragile Arctic environments. To compensate for these issues, we investigate the potential for reconstructing composite ridge system formation based on geomorphological evidence alone, focusing on clear morphostratigraphic relationships between ridges within the moraine complex and relict meltwater channels/outwash fans. Based on mapping at the margins of Finsterwalderbreen (in Van Keulenfjorden) and Grønfjordbreen (in Grønfjorden), we show that relict meltwater channels that breach outer parts of the composite ridge systems are in most cases truncated upstream within the ridge complex by an inner pushed ridge or ridges at their ice-proximal extents. Our interpretation of this relationship is that the entire composite ridge system is unlikely to have formed during the same glacier advance but is instead the product of multiple advances to successively less-extensive positions, whereby younger ridges are emplaced on the ice-proximal side of older ridges. This indicates that the Finsterwalderbreen

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