

Surge-type glaciers in Svalbard identified through remote sensing

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Identifying glaciers that exhibit surge-type behaviour is important as we aim to use evidence of ice front fluctuations as a proxy for reconstructing past climate oscillations. The relationship between surge activity and climatically controlled glacial mass balance is not entirely clear. This project identifies previously undocumented surge-type glaciers in Svalbard, based on the presence of crevasse squeeze ridges (CSRs; also called fill ridges) visible in glacier forelands. Crevasse squeeze ridges are believed to be a landform unique to surge behaviour. Although it is acknowledged that many Svalbard outlet glaciers surge, estimates vary greatly as to the actual number of surge-type glaciers, and their distribution pattern is not well understood. A detailed survey of recent (2008-2012), high-resolution aerial imagery from Toposvalbard, provided by the Norwegian Polar Institute, allowed for a rapid analysis of forelands of Svalbard glaciers. Using CSRs as indicators of surge behaviour has almost tripled the amount of potential surge-type glaciers in Svalbard. Limits to the CSR identification method are discussed. Additionally, as the forelands of previously reported surge type glaciers were analysed for CSRs, it was evident that the unique surge landforms were not present in approximately a third of the known surge-type glacier forelands. Numerous factors control the formation and preservation of CSRs including glacier size, bedrock lithology, subglacial sediments and clast size as well as glacial fluvial run-off. This presentation will focus on the controlling factors for CSR formation and preservation as well as the relation between surge activity and climate on Svalbard.