FORELAND EVOLUTION OF BLÅISEN, NORWAY, OVER THE COURSE OF AN ABLATION SEASON

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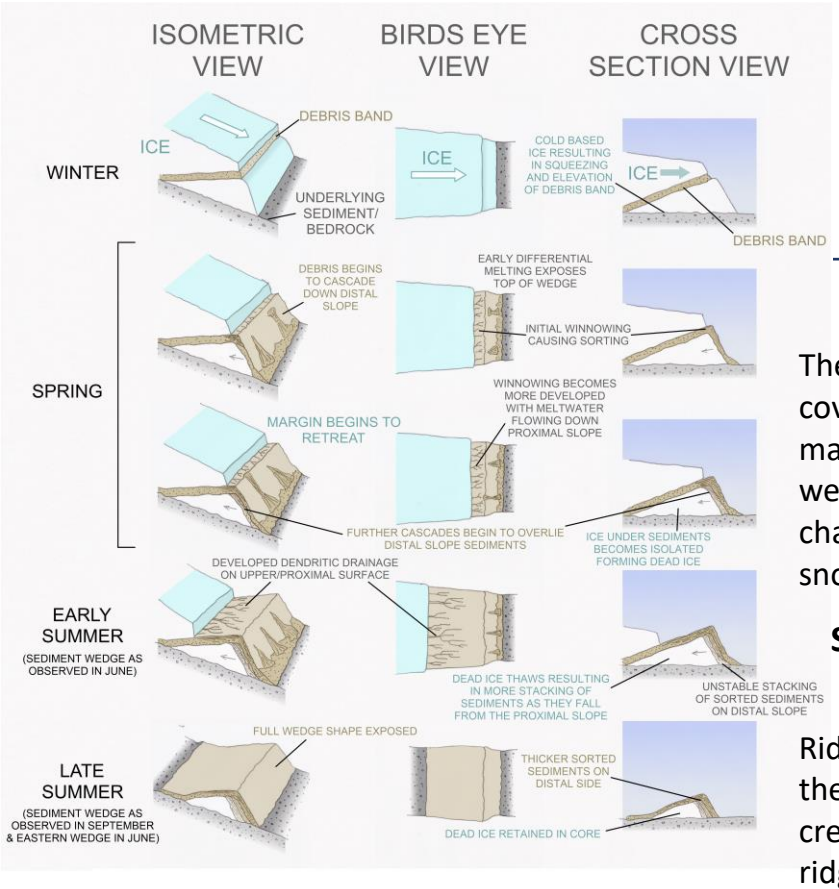
JUSTIFICATION & AIMS

Glacial studies are important for understanding the past, present and future response of the cryosphere to climate forcing. Relatively few studies focus on smaller scale features (both in the temporal and spatial sense) that are often poorly preserved meaning they may be missed during investigations. This study aims to investigate newly forming and exposed landforms in the foreland of Blåisen over an ablation season



Sediment Wedge Formation and Evolution

As the name suggests, the feature was wedge shaped with a steeper distal slope formed as sediment brought up in a debris band at the margin and deposited on the proximal slope, slumped down the distal slope as the underlying dead ice thawed (illustrated in the diagram above). Another similar feature was recorded nearby to the east and was proposed to have a shared genesis process and presents an older more poorly preserved form (represented above as the Late Summer). It is likely that the sediment in the band originated from the base of the glacier and was transporting as a debris septum, as the material composing the wedges was sedimentologically distinct from the surrounding foreland.

CONCLUSIONS

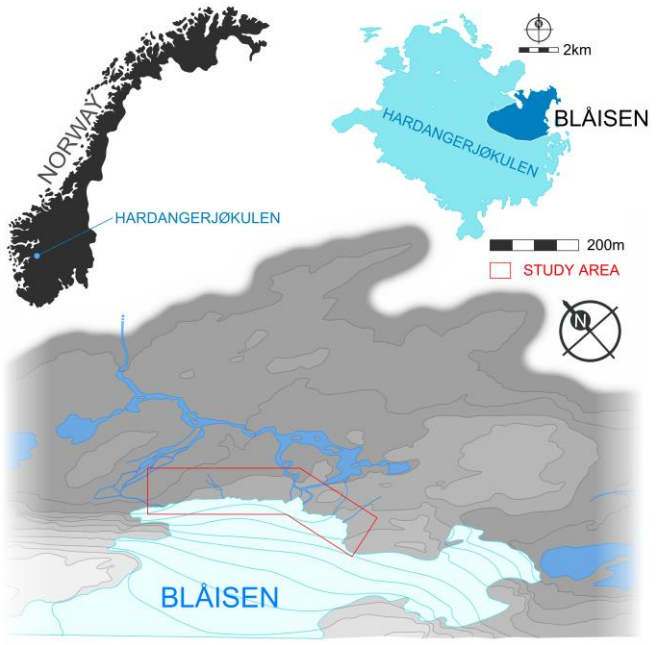
This study presents a number of valuable findings, documenting sparsely researched landforms. The developments between June and September, particularly the disappearance of the snowbank squeeze moraines highlights the poor preservation of these landforms. This illustrates how they may be missed in other studies and the need for further research in this area.

METHODS

Blåisen, an outlet glacier of the Hardangerjøkulen icecap was visited twice in June and September of 2019.

On each visit, observations were recorded and landforms were mapped using GPS. Particular focus was given to landforms along the glacial margin, shown in the site location map (right).

Structure from Motion was used to create 3D models of two small sites during each visit for further analysis and comparison.



RESULTS & DISCUSSION

The ice margin retreated ~30-40 m over the summer of 2019, exposing landforms covered by ice and snow in June. Four main landform types were observed and mapped: snowbank squeeze moraines, flutes, minor moraines, and an ice-cored wedged shaped ridge system (called a sediment wedge in this study after its characteristic shape). Here the formation and evolution of the sediment wedge and snowbank squeeze moraines are focused on.

Snowbank Squeeze Moraines Formation and Evolution

Ridges of sediment protruding out of the snow were observed in June. A crevasse intersecting one of these ridges offered a cross sectional view (illustrated right, in panel 3). This presented evidence that they had formed by the deformation (squeezing) of sediments between the ice margin and the winter snowbank lying over the margin. The sediments were saturated due to the localised reverse bedrock slope preventing meltwater drainage; this made the sediments easily deformable.

The 'squeeze' type of snowbank moraines has not been widely studied in part due to their poor longer-term preservation beyond a few months. This is in partially to the requirement of easily deforming often saturated sediments for their formation, which quickly erode once the buttressing effect of the surrounding ice has been removed (illustrated right, in panel 5). This was illustrated by the lack of remaining evidence for them in September (illustrated right, in panel 6).