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Detailed geomorphological mapping of debris-covered and rock glaciers in the Hólar area, Tröllaskagi Peninsula (northern Iceland).

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Most studies conducted on rock and debris-covered glaciers only include simplified geomorphological maps representing main units (ridges, furrows, front, and thermokarst depressions). The aim of this study is to develop a detailed geomorphological mapping of the Hóladalsjökull debris-covered glacier (65°42' N; 18°57' W) and the Fremri-Grjótárdalur rock glacier (65°43' N 19° W), located near Hólar, a village in the central area of the Trolläskagi peninsula (northern Iceland).

The mapping process has been conducted using standard stereo-photointerpretation of aerial photographs and stereo-plotting of a topographic map at 1:2000 scale. Also, landforms have been represented in different transects. Lastly, the geomorphological map has been designed using the elevation digital model, and a 3D pdf file has been generated, allowing for better viewing and understanding the different units and their modelling.

The geomorphological mapping of the Hóladalsjökull debris-covered glacier and the Fremri-Grjótárdalur rock glacier represents the prominent walls of their valley heads and their summits, which form a flat highland at 1,200-1,330 metres above sea level, covered by blockfield and patterned ground features. Rockfall and slide landforms are common processes at the foot of these 100-170 metre-high cirque-walls. Debris-covered glaciers and rock glaciers are born right under these walls, building up a spoon-shaped hollow around glacial ice, surrounded by young moraine ridges at their fronts.

The dominant features in the Hóladalsjökull debris-covered glacier are large longitudinal ridges and furrows, stretching over 1.5 km in length in the central and western areas. Medium-sized thermokarst depressions (between 15-40 metres in diameter), often running parallel to the furrows, dot the surface of the debris-covered glacier. Parallel alternate ridges and furrows can be seen near the snout. Ridges are rugged and fall around 30-40 metres, with over 30 degree slopes, whereas furrows have smoother hillsides. The snout of the debris-covered glacier is around 900 m high.

Several units of rock glaciers from different overlapping ages can be distinguished in the Fremri-Grjótárdalur cirque. Deep and meandering furrows have developed in the contact areas between the main lobes. The lobes of the youngest rock glaciers, located at the cirque head, reach a length of between 0.5 km and 1 km. Their morphology changes from their rooting zone, with alternate smooth furrows and ridges extending towards their front, where steep ridges and furrows appear, and ends in a steep front between 896 and 922 m high. These rock glaciers overlap one another on a fossil rock glacier, rising another 400 m until they reach a height of 850 m.

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