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Towards an Understanding of Rock Glacier Initiation in the Gaissane Mountains, Northern Norway

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Active rock glaciers are geomorphic expressions of permafrost in the shape of lobate- or tongue-shaped slope accumulation landforms. Relict features may, thus, give information about the palaeo-permafrost distribution. One important limitation to this approach is the problem of the correct dating of the active phase of the studied landforms. In the Gaissane Mountains, Northern Norway (69˚57'N, 24˚47'E) the front of two lobate-shaped, talus-derived rock glaciers are situated at about 450 m a.s.l. These rock glaciers partly overrun a moraine ridge of presumable Preboreal age. One presumably active rock glacier has been investigated by Electrical Resistivity Tomography (ERT) and ground surface temperature measurements (BTS, MTD). The results show that the rock glacier presently contains permafrost, probably with a considerable amount of ground ice. Age dating based on cosmogenic isotope analysis of surface samples of this rock glacier is currently in progress. Schmidt-hammer measurements from a close by rock glacier, the Preboreal moraine ridge and an active avalanche boulder tongue suggest that the rock glaciers were initiated soon after the Preboreal. A presumably relict tongue-shaped rock glacier, considerably larger than the two lobate shaped ones, is present at substantially lower altitude (front at 180 m a.s.l.). This rock glacier is not connected to its headwall and may have initially started as a rock slide with a subsequent rock glacier formation. This hypothesis fits with an early Holocene initiation as this period is associated with some strong earthquakes in Northern Norway and presumable paraglacial responses following the retreat of the Fennoscandian Ice Sheet.

In addition, the early Holocene climate was a cold period in northern Fennoscandia, so rock glacier formation at this low altitude seems feasible.