



Towards a national inventory of continuous rock glaciers movement in Norway based on InSAR

Karianne Lilleøren (1), Bernd Etzelmüller (1), and John Dehls (2)

(1) Department of geosciences, University of Oslo, Norway (k.s.lilleoren@geo.uio.no), (2) Geological Survey of Norway, Trondheim, Norway

Creeping permafrost landforms in Norway are widely distributed over the country. While in southern Norway features originated from ice-cored moraines dominate in high elevation, northern Norway has clusters of both active and relict rock glaciers derived mainly from talus slope deposits. Mapping of these features was mainly based on interpretation of aerial photos of varying quality and resolution, which opens for misinterpretation of both type and activity status, along with lacking observations. E.g., in the northern part of Finnmark in Northern Norway, a group of rock glaciers exists close to sea level, and has been mapped as relict features in our inventory. Since 2015, we have investigated one of these rock glaciers (Ivarsfjord rock glacier) more closely using high resolution (10 cm) SfM, DEM comparison and ERT surveys, revealing a significant displacement pattern indicating an active rock glacier.

The Geological Survey of Norway (NGU) has recently published a nationwide database of radar interferometry measurements (InSAR; <https://insar.ngu.no/>). The data is collected from the Sentinel 1-satellites, part of the EU Copernicus program, and data exist from October 2014, with a temporal resolution of up to 6 days during the snow-free season. The database is openly available, and has until now be used to identify unstable rock slope areas and vertical movement of buildings and infrastructure.

To evaluate the activity of Norwegian rock glaciers we systematically compared the InSAR database to our existing rock glacier inventory. The high correspondence between the existence of rock glaciers and large ground displacement verifies the inventory interpretations. The field measurements from the Ivarsfjord rock glacier correspond to a large degree to the InSAR-derived displacements. Further, areas of large displacement in the InSAR dataset were investigated more closely, and in this way several areas of rock glaciers previously not mapped were discovered. Here we will present the result of our dataset comparison in terms of activity classification, flow velocities and their variations in time and space in Norway.