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# Continuously monitoring of Gámanjunni 3, 26 Mm3 unstable rockslide, Kåfjord, northern Norway.

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Gámanjunni 3 is a 26 Mm3 large unstable rockslide located in Kåfjord, northern Norway and is the third fulltime-monitored site in the municipality. Based on the movement of 2-6 cm/year towards W-SW, well-developed failure structures and relatively large consequences, the rockslide is classified as a high-risk object. Gámanjunni 3 has a fully developed wedge with a 150m vertical displacement. The lateral limits are well defined with open cracks in the rockslide. At the southern lateral limit, a collapse has occurred forming a loose rockmass resembling a rock-glacier. The structure that controls the sliding plane is not well understood. The runout from a large rockslide from Gámanjunni 3 will cross the valley and dam the river below. A large rockslide will directly affect several buildings and farms in the hazard zone. Run-out modelling, dam-breach analysis and flood modelling are completed.

As a high-risk object, the unstable rockslide is now under continuously monitoring. The continuously monitoring was established in October 2016 by NVE (The Norwegian Water Resources and Energy Directorate). The monitoring network contains GPS-antennas, extensometers, crackmeters, laser, web cameras, platforms for helicopter and a weather station. A ground-based radar (GB InSAR) in the valley monitor the rockslide continuously. To obtain redundancy in the monitoring the satellite radar (InSAR) are valuable, and corner reflectors are placed in the unstable area to improve the signals. Sentinel-1 radardata from the corner reflectors are processed on a weekly basis.

Geophysical surveys in form of resistivity and seismic have been performed in order to build a better geological model. Permafrost investigations using temperature loggers as well as analyzing the geophysical data have been performed. Based on the resistivity and the seismic surveys, the University of Fribourg made a 4-phase model that has compared the results. The 4-phased model indicates permafrost condition of at least 30-50m thickness in the upper part of the rockslide.

Except from a rock-glacier that speeds up through summertime there is not much seasonal variation in the deformation measurements through the year. There is variation in different parts of the rockslide, where the deformation is bigger in the upper part and decrease to the lower part. It seems also to be variations in the vertical component, with steeper vertical gradient in upper part and more gentle in the lower part, probably reflecting the geometry of the sliding plane. On July the 17th , a rockfall occurred and a big block came down to the road below. The rockfall is related to heavy precipitations the days before.

The monitoring of Gámanjunni 3 rockslide will continue. Precursors of a catastrophic failure such as acceleration of movement will ensure that endangered population can be evacuated prior to a failure. A consequence of monitoring deformation and temperatures is a continuously increased geological understanding of the rockslide processes