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Monitoring of a steep rockfall area experiencing fast displacements in Kåfjord, Northern Norway

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An unstable rockfall area in Kåfjord, Northern Norway, was recognized during periodic monitoring campaigns in July and early September 2015. The LiSALab ground based Interferometric Synthethic Aperture Radar (GB InSAR) from Ellegi were used. A relatively sharply defined steep area of 1200 m2 (6.000 – 12.000 m3) was documented to be in movement. Norwegian Water Resources and Energy Directorate (NVE) was at this point performing mitigation work in terms of an embarkment within the rockfall run-out area. The monitoring system was reinstalled and adjusted to perform continuous monitoring with an early-warning aim. The section for rockslide management in NVE was responsible for the monitoring and the warning to the municipality and Police. The displacements increased from about 1 mm/day in July to 3 cm/day in mid September. People were evalcuated due to increased velocities the 16th of September. The displacements continued to increase in several stages, and with a distinct accelleration the 2nd of October. The velocity peaked in a short window to more than 200 cm/day, and it ended with a partly frontal and sideway collapse of the unstable area. However, large parts of the area stabilized again, and the run-out lengths from the small rockfalls were limited. The GB InSAR system operated exceptionally well during the event, and were able to follow continuously the displacements during the accelleration stage until collapse as the processing time window was frequently adjusted to the changes in velocity. We were also able to follow inidividual rockfalls from the images – primarily as the rockfall impact points on the slope below showed up clearly on the radar images. The area continued to stabilize due to falling temperatures, and the mitigation work were finished during the fall. The displacements seem to be correlated to the increasing temperatures in late summer and precipitation events.