



## **Monitoring and forecasting local landslide hazard in the area of Longyearbyen, Svalbard - early progress and experiences from the Autumn 2016 events**

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Since 2013 the Norwegian Water Resources and Energy Directorate (NVE) has operated a landslide early warning system (LEWS) for mainland Norway. The Svalbard islands, situated 800 km north of the Norwegian mainland, and 1200 km from the North Pole, are not part of the conventional early warning service. However, following the fatal snow avalanche event 19 Dec. 2015 in the settlement of Longyearbyen (78° north latitude), local authorities and the NVE have initiated monitoring of the hydro-meteorological conditions for the area of Longyearbyen, as an extraordinary precaution. Two operational forecasting teams from the NVE; the snow avalanche and the landslide hazard forecasters, perform hazard assessment related to snow avalanches, slush flows, debris flows, shallow slides and local flooding. This abstract will focus on recent experiences made by the landslide hazard team during the autumn 2016 landslide events, caused by a record setting wet and warm summer and autumn of 2016.

The general concept of the Norwegian LEWS is based on frequency intervals of extreme hydro-meteorological conditions. This general concept has been transposed to the Longyearbyen area. Although the climate is considerably colder and drier than mainland Norway, experiences so far are positive and seem useful to the local authorities. Initially, the landslide hazard evaluation was intended to consider only slush flow hazard during the snow covered season. However, due to the extraordinary warm and wet summer and autumn 2016, the landslide hazard forecasters unexpectedly had to issue warnings for the local authorities due to increased risk of shallow landslides and debris flows. This was done in close cooperation with the Norwegian Meteorological Institute, who provided weather forecasts from the recently developed weather prediction model, AROME-Arctic.

Two examples, from 14-15 Oct and 8-9 Nov 2016, will be given to demonstrate how the landslide hazard assessment for the Longyearbyen area is carried out. Several aspects contrast hazard monitoring and forecasting on the mainland, such as the challenges that transpire with sparse observations of hydrometeorological variables, landslide inventories and hydrological simulations. Particular challenges that are faced on Svalbard, are the even greater remoteness of the settlements and the strong effect permafrost has on the soil structure. The planned development for improving the monitoring of slush avalanches and landslide hazards in the Longyearbyen area will also be presented.