

Local scale monitoring and landslide hazard assessment using Internet of things technology to improve landslide forecasts in Norway

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ABSTRACT

Climate projections for Norway indicate an increase in temperature and precipitation, respectively, of 4.6 degrees and 30 percent by the end of the century. This will significantly increase the frequency of extreme rainfall events, temperature changes and consequently snowmelt episodes that are the main triggering mechanisms of the so-called weather-induced landslides, like debris flows, debris avalanches and slushflows. The Norwegian government has already undertaken a number of actions to better predict landslides and reduce risks. Some actions include landslide characterization, susceptibility and hazard assessments and the establishment of a regional landslide forecasting and warning service. Regional warnings are daily sent to the public, indicating where in the country landslides are expected. The current strategies used for predicting landslides are relatively efficient at regional scales (e.g., 100 km) and useful for national and local stakeholders. However, our users require more precise warnings at local scale, particularly in highly prone-areas. As the area of the analysis reduces to a catchment or slope-scale (e.g., 10 km), the uncertainties start to dominate in the predictions because the number of observations of events, on which the predictions are calibrated, reduces in a smaller area. Some of the main challenges arise from the lack of knowledge on geotechnical, hydrological and meteorological landslide triggering parameters.

KlimaDigital is a project that aims to reduce societal risks imposed by geohazards in the changing climate with a novel **geohazards assessment framework (GAF)** supported by the digital technology. The development of the framework will be focused on landslides and based on novel Internet of Things (IoT) technology by establishing a network of sensors connected to the internet in a landslide susceptible area in a region where life and property are under threat.

The implemented GAF will be demonstrated on a study area within the Trøndelag region, close to the city of Trondheim, well known to be highly susceptible to landslides. In this area, landslides can be triggered by intense rainfalls, by intense snowmelt or by a combination of both. Around 600 events have been registered in the past 18 years that have caused significant damages on transportation lines, that connect Northern and Southern Norway. In the selected area climate and weather models will be prepared and integrated in the GAF and different sensors will be installed during 2019-2020. This paper will provide an overview of existing regional and national strategies for predicting landslides in Norway, and plans for the implementation of a local IoT-based landslide assessment strategy in Trøndelag.

REFERENCES

- [1] <https://www.sintef.no/projectweb/klimadigital/>
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