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Improvement of the temporal resolution of thresholds used by the Norwegian landslide warning service; future steps

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Recent improvements in the temporal resolution of observed meteorological data at a nationwide scale, as well as improved routines of data management and hydrological simulations, from daily to three hourly, will in near future make a new generation of regional landslide thresholds available for the landslide early warning service at NVE. The service has been operational since 2013, providing daily landslide hazard evaluations based on several types of information, in which thresholds with 24-hour resolution so far have been integral. The thresholds are based on a combination of normalised water supply (rainfall and snowmelt) and simulated water content in the soil. Experiences with the thresholds have often been satisfying, exemplified by large low-pressure weather systems arriving from the Atlantic triggering landslides. However, intense rainfall; particularly during summer showers, and heavy rainfall during a few hours of duration, have been identified as very difficult to detect with the current threshold. Thresholds with finer time resolution will enable a more precise warning in these cases.

The following methodological steps are planned for this year: (a) Quality assessment of landslide inventories, specifically how to allocate events within three hourly intervals. (b) Performing a regression analysis, using tree classification, on various hydrometeorological variables. (c) Establishing threshold based on the statistical analysis, and make final adjustments by comparing the spatial distribution of thresholds, and level of impact (green, yellow, amber or red) to the locations and number of quality assessed landslides within a given region. This should result in more refined regional landslide thresholds with three- or six-hourly resolution with a moving three-hourly window. The improved thresholds are expected to: (i) Identify critical rainfall and snowmelt events with shorter time durations, down to a few hours. (ii) Identify short, but critical, periods with warming (and wind) causing critical rates of snowmelt.