Prediction of geohazard triggering by meteorological variables using classification trees

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Geohazards such as snow avalanches, clay-, debris-, and rock slides pose a threat to humans and infrastructure in Norway. Each geohazard event is preceded by a complex interaction of various processes acting at both short and long time scales. The complexity is enhanced by local variations in parent material and makes it difficult to predict deterministically the time and location of a geohazard event. Short- and long-term meteorological variables such as precipitation and temperature exhibit a strong control on the timing of geohazard events in a given location and can be used to predict the probability of a geohazard event in a given area. We couple a database with more than 20.000 recorded geohazard events to a climate database to evaluate the predictability of event triggering from meteorological variables. Events are from all parts of Norway and span the period from 1961 to 2005. The database is divided into snow avalanches, clay-, debris-, and rock slides, and mainly includes events that have in some way interfered with humans or infrastructure such as roads, railway lines or houses. The climate database contains daily maps of a number of meteorological variables for Norway with 1 km resolution. For each geohazard event meteorological variables have been extracted based on its location and date. These meteorological variables are used as independent variables to predict days with geohazard events on the local, regional and national scale using classification trees. The analysis shows a high degree of predictability of event days at the local scale, but a decrease in predictability with increasing scales. The most important meteorological triggering variables are generally related to precipitation but these show spatial variations, reflecting the varying climates in the country. Finally, we discuss how the predicted climatic amelioration in Norway may affect the future frequency of geohazard events in the

various regions of the country.