



Dynamic, physical-based landslide susceptibility modelling based on real-time weather data

Ekrem Canli and Thomas Glade

University of Vienna, Department of Geography and Regional Research, Vienna, Austria (ekrem.canli@univie.ac.at)

By now there seem to be a broad consensus that due to human-induced global change the frequency and magnitude of precipitation intensities within extensive rainstorm events is expected to increase in certain parts of the world. Given the fact, that rainfall serves as one of the most common triggers for landslide initiation, also an increased landslide activity might be expected.

Landslide occurrence is a globally spread phenomenon that clearly needs to be handled by a variety of concepts, methods, and models. However, most of the research done with respect to landslides deals with retrospect cases, thus classical back-analysis approaches do not incorporate real-time data. This is remarkable, as most destructive landslides are related to immediate events due to external triggering factors. Only few works so far addressed real-time dynamic components for spatial landslide susceptibility and hazard assessment.

Here we present an approach for integrating real-time web-based rainfall data from different sources into an automated workflow. Rain gauge measurements are interpolated into a continuous raster which in return is directly utilized in a dynamic, physical-based model. We use the Transient Rainfall Infiltration and Grid-Based Regional Slope-Stability Analysis (TRIGRS) model that was modified in a way that it is automatically updated with the most recent rainfall raster for producing hourly landslide susceptibility maps on a regional scale. To account for the uncertainties involved in spatial modelling, the model was further adjusted by not only applying single values for given geotechnical parameters, but ranges instead. The values are determined randomly between user-defined thresholds defining the parameter ranges. Consequently, a slope failure probability from a larger number of model runs is computed rather than just the distributed factor of safety. This will ultimately allow a near-real time spatial landslide alert for a given region.