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Preliminary rockfall hazard identification of the "La Crevasse" area (Wallis, Switzerland) coupling field and DEM analysis

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“La Crevasse” area, located between the Val de Bagnes and Val d’Entremont (Wallis, Switzerland), represent an active unstable area where rock falls and debris flows threaten two roads, vineyards, as well as a railway.
The rockfall potential sources have been defined by analysis of high resolution digital elevation model (HRDEM). The susceptibility for each DEM cell was evaluated based on different structural and geomorphic criterion (dip angle, orientation, density of potential planar and wedge sliding, denudation potential and distance from tectonic features).
Dip angle analysis was carried out by computing the slope histogram over studied area. Then, the slope frequency distribution was divided in different Gaussian functions in order to detect the distribution representing the cliff outcrops. Major discontinuities and tectonic accidents were identified using COLTOP3D software. The intersections of these discontinuities with topography were automating mapped (Matterocking software), providing the densities for planar sliding and wedge failure at each DEM cell. The denudation potential of rock masses was defined by a local base level between two virtual watercourses. In the study area different tectonic features influence locally the rock mass quality and it was integrated by buffers around the mapped features. Addition and weighting of these factors led to built up a failure susceptibility index, which underlines the potential source areas. High susceptibility cells were used as source areas for “2D and 3D” trajectography modelling. Field survey, orthophoto and as well available historical data were used to calibrate the trajectography parameters (block mass, coefficient of restitution, roughness). These analyses allow creating a preliminary rock fall hazard map and it was integrating in a modified version of the RHRS method in order to assess the quantitative risk along the road located below the “La Crevasse” area. The modified RHRS version allows to taking into account the local geological and geomorphological conditions as well as the available data taken on the studied field.