

# Rockfall hazard mapping along a mountainous road in Switzerland using a GIS-based parameter rating approach

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**Abstract.** *A posteriori* studies of rock slope instabilities generally show that rockfalls do not occur at random locations: the failure zone can be classified as sensitive from geomorphological evidence. Zones susceptible to failure can therefore be detected. Effects resulting from degrading and triggering factors, such as groundwater circulation and freeze and thaw cycles, must then be assessed in order to evaluate the probability of failure.

A simple method to detect rock slope instabilities was tested in a study involving a 2000-m<sup>3</sup> rockfall that obstructed a mountainous road near Sion (Switzerland) on January 9, 2001. In order to locate areas from which a rockfall might originate, areas were assessed with respect to the presence or absence of five criteria: (1) a fault, (2) a scree slope within a short distance, (3) a rocky cliff, (4) a steep slope, and (5) a road. These criteria were integrated into a Geographic Information System (GIS) using existing topographic, geomorphological, and geological vector and raster digital data. The proposed model yields a rating from 0 to 5, and gives a relative hazard map. Areas yielding a high relative hazard have to meet two additional criteria if they are to be considered as locations from which a rockfall might originate: (1) the local structural pattern has to be unfavourable, and (2) the morphology has to be susceptible to the effects of degrading and triggering factors. The rockfall of January 9, 2001, has a score of 5. Applied to the entire length of the road (4 km), the present method reveals two additional areas with a high relative hazard, and allows the detection of the main instabilities of the site.