



Failure mechanisms analysis and reconstruction of pre-failure topography: examples of rockslide scars in Rhône valley, Switzerland

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Rockslides and rock avalanches are very frequent in glacial valleys, especially after the glacial retreat. This could mainly be related to the glacial debuttressing. In the Alps, most of the deeply incised glacial valleys are nowadays filled with morainic deposits, fluvial and lake sediments. The slope stability of the valleys flanks has been significantly changed by the sediments filling the valley creating a buttress, which stabilizes the slopes. In the Rhône valley (South-Eastern Switzerland), several rockslides scars are visible but only their upper parts outcrop within the valley's flanks, the bottom being buried below the post-glacial sediments. In this study, an attempt to reconstruct the pre-failure and the pre-filling topography was carried out. First, a detailed mapping of the rockslide scars using the 1-m laser DEM, orthophotos and Google earth™ visualization was performed. A GIS-based database was built up in order to uniform the information of the present and the previous studies. Using the Sloping Local Base Level method (Jaboyedoff and Derron, 2005) and available geophysical data the 3D bedrock topography was reconstructed. Structural surveys of more representative rock side scar have been carried out in order to assess the potential failure mechanism of the past rockslide and to obtain the geometrical limits of the rockslide volumes. The pre-failure surface was reconstructed based on major structural limits using the Sloping Local Base Level method. Main results indicate that pre-failure volume is often underestimated without taking into account the instability volume located under the actual valley floor. This study represents also basic steps that will permit to assess the erosion rate induced by rockslides after the glacial retreat.