



## Case study of rock fall and landslide hazard in an alpine valley

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The "les Pics" area, located in the Rhône valley (canton of Wallis, southwestern Switzerland), is a complex unstable system, composed by a deep-seated gravitational landslide (DSGS) and characterized by recurrent rockfall activity. A 30,000 m<sup>3</sup> rockfall occurred in 2004, partly obstructing a secondary road crossing the slope. During historical events, some blocs even reached the Rhône valley. The mechanisms of both the DSGS and the rockfalls, as well as their possible relationships have been investigated. Field and computer analysis (Self-Potential profiles (SP), field measurements and DTM-based computing) show that the DSGS is linked to a major fault that affects the whole slope. The mean orientation of the slope (085/60) is nearly parallel to the Rhône valley. Sedimentary and tectonic field observations demonstrate that this fault became active after the deposition of the moraine. Thus, the fault is probably related to the retreat of the Rhône glacier 17,000 years BP. Geomorphologic observations indicate that at present, the DSGS has a very low displacement rate. Water infiltrations in the upper part are confirmed by the SP measurements. The infiltrations are localized in depressions due to minor faults that are sub-parallel to the major one. DTM analysis and field work in the rockfall failure areas demonstrate that the strong activity is mainly due to sliding wedges made up of two tectonics joints, generally oriented 238/88 and 126/70. In the northern part of the study area, the bedding plane orientation (016/20) can also induce rockfall activity. Due to the main orientation of the slope, the main instability factor seems to be freeze and thaw cycle. The results of the various investigations were integrated in a GIS, and a preliminary hazard map was created. This hazard map has to be improved by further investigations.