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Coupling high resolution digital elevation model analysis and PSInSARâ[U+0084]¢ data to characterize large rock slope deformations

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The detailed mapping and monitoring of large slope deformations represent an important step for landslide hazard assessment in alpine areas. Very active and destructive landslides are often part of these deep seated gravitational movements. In this study, PSInSAR™ data and high resolution digital elevation model (HRDEM) analysis were used to characterize the present-day activity of large instabilities in Saastal and Mattertal valley, South-Western Switzerland. HRDEM allowed to define precisely the slope instability limits and to reflect the landslide morphology. Available PSInSAR™ data are composed by 80 radar image set covering the period between June 1991 and October 2008. This data have shown to be a very useful to study slope mass movements both at local scale and at regional scale. At local scale for instance, it was possible to assess the surface activity of the slope (mean velocity, local variations, etc). Displacement rates derived from time series of groups of target allowed the distinction between seasonal variations, noisy signals and the real displacement trend. Combining these information with a geomorphological analysis, it was then possible to propose a failure mechanism.
At regional scale, PSInSAR™ data were used as support to detect new potential instabilities areas, which were difficult to characterize from a geomorphological point of view only.
Preliminary analysis confirm that the studied sackungen show a limited displacement rates (∼4-8 mm/y). However, inside the large unstable mass, it is often possible to detect shallow instabilities with higher displacement rate (5-8 cm/y).