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The OMIV Observatory on landslides - Observing with Multi-parameters the Instability of Versants

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The OMIV Observatory on landslides (Observatoire Multi-disciplinaire des Instabilités de Versants; e.g. Multi-disciplinary Observatory on Slope Instabilities) is a French-research initiative clustering five research institutes in earth sciences (e.g. GéoAzur in Nice; EOST-IPGS in Strasbourg, LETG in Caen, LGIT in Grenoble, LST in Lyon) under the auspices of INSU (Institut National des Sciences de l'Univers) since 2007.
The primary objectives of OMIV are (1) to deploy and maintain permanent instrumental networks
in order to be able to (2) to provide robust, long-lasting multi-parameter, open datasets to the international geoscience community. Such continuous monitoring of ongoing landslides are missing and they will provide constrains on the processes that lead to slope instabilities.
Worldwide, the societal impact of landslides is one of the most important natural hazard in mountainous and rocky coastal areas. The variability in time and space of the slope structures and their susceptibility to external forcing (weathering, earthquake, climatic triggers) restrain our ability to simulate and forecast slope instabilities.
Four active large landslides are monitored by the OMIV observatory group; these sites have been chosen according to their past history of monitoring, to the risk they may create and to the scientific challenges they raise up. The four studied landslides are: the Avignonet landslide (30 km South of Grenoble) and the Super-Sauze landslide (5 km South to Barcelonnette) which are soft-rock slides developed in clays for which the susceptibility to rainfalls and earthquake is the main open question; the La Clapière (100 km North of Nice) and the Séchilienne landslide (25km East of Grenoble) which are typical mature and immature large scale rock mass gravitational instabilities, respectively.
On these four pilot sites, the OMIV research group is monitoring in continuous three types of observations: landslide kinematics (deformation and displacements), landslide seismic activity (through passive seismic auscultation), and landslide slope hydrology (hydrodynamics and hydro-geochemistry). These observables are open datasets which are available through the OMIV website (for the four sites, http://www-lgit.obs.ujf-grenoble.fr/observations/omiv/donnees.html and for the Super-Sauze landslide also at http://eost.u-strasbg.fr/omiv).
When kinematics, hydrology and seismic activity are the main observables for many monitored landslides worldwide, only a few of them combines the three types of observables at relevant spatial and temporal scales. It is hypothesized by the OMIV observatory group that the combination of these three measurements will give access to a better knowledge on the physical processes controlling landslide behavior, such as the generation of brittle damage in the landslide material during sliding, the recognition and characterization of slip surface(s), the characterization of the hydrological behavior of the slope before and after failure. It opens possible routes toward characterizing the macro-scale rheology of the systems (e.g. brittle plastic transition for hard rock slopes, slide to flow transition for soft-rock landslides). The cross analysis of the monitoring data will bring new insights on the kinematics and dynamics of unstable slopes. In this study, we present (i) the technical organization of the multi-parameter monitoring datasets, and (ii) preliminary results from the ongoing monitoring.