



## **LANDMON a new integrated system for the management of landslide monitoring networks**

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Over the last decades, technological development has strongly increased the number of instruments that can be used to monitor landslide phenomena. Robotized Total Stations, GB-InSAR and GPS are only few examples of the devices that can be adapted to monitor the topographic changes due to mass movements. They are often organized in a complex network, aimed at controlling physical parameters related to the evolution of landslide activity. The level of complexity of these monitoring networks increases with the number of new available monitoring devices and this could generate a paradox: the source of data is so numerous and difficult to interpret that a full understanding of the phenomenon could be hampered. The Geohazard Monitoring Group (GMG) of Italian National Research Council (CNR) has a long experience in landslide monitoring. Over the years, GMG has developed a multidisciplinary approach for landslide management strategy called LANDMON (LANDslide MONitoring Network). It is an automatic hybrid system focused not only on capturing and elaborating data from monitored site but also on web applications and on publishing bulletins aimed to disseminate monitoring results and to support decision makers.

LANDMON is currently active in many landslide sites distributed in several areas in Italy and in Europe. LANDMON is derived from the previously developed systems like ADVICE (ADVanced dISplaCement monitoring system for Early warning) and 3DA (three-dimensional Displacement Analysis). These systems are aimed to collect and to process monitoring dataset, to manage early warning application based on pre-defined thresholds, and to publish three-dimensional displacement maps in near real time. In addition, LANDMON integrates several new features, such as WebGIS application, modelling using inverse velocity method, and management of webcam monitoring system, meteorological parameters and borehole inclinometric data.

Moreover, LANDMON is a communication strategy that focuses on dissemination of the landslide monitoring results in order to obtain a user-friendly system. In fact, this kind of results are usually very complex and they are dedicated exclusively to professionals with a proper background. This approach may be inefficient during the management of emergencies, especially when groups of non-expert people (decision and policy makers, population) are involved.

For this purpose, an automatic procedure to produce a single page bulletin has been developed. The algorithm performs the analysis of complex data regarding the activity of the monitored landslide, but the results shared with end-users of LANDMON are summarized in a clear, illustrative and quickly interpretable manner.

Therefore, LANDMON is a complex, complete and self-contained system, designed for efficient acquisition, analysis, representation and appropriate dissemination of the monitoring data.