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Digital photogrammetric analysis and electrical resistivity tomography for investigating a landslide located in Basilicata region (southern Italy).

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The combined application of the most modern methodologies and techniques in the field of the remote sensing, of the geomorphology and of the applied geophysics is fundamental to define correct and practicable strategies for the hazard evaluation and for the damages estimate produced by a mass movements. The purpose is to consolidate and/or mitigate the landslide affected areas.
The aim of this job has been to reconstruct the volumetric history and the geomorphologic evolution of the main landslide parts of a complex roto-translational slide that, because of the hard weather, in March of 2006 occurred in an area located in the Picerno (PZ) territory. The landslide is 600 m length and 230 m wide with a range of altimetry varying between 1072 m s.l.m. in the main crown and 978 m s.l.m. in the toe of the landslide.
For studying this landslide, a multitemporal analysis on aerial photo of the years 1997, 2004 and 2007, in an apparent scale of 1:18000, has been applied by using the digital photogrammetric technique via the software SOCETSET version 5.4.1.
For each year, the morphological characterization of the landslide body through digital photo interpretation at a maximum scale of 1:5000 has been performed, with the aim to identify the different geomorphological features (scarps, terraces, trench) and their development, and mainly the morphological units (displaced material) characterizing the investigated landslide.
Then DEMs have been produced choosing a 5 x 5 m pixel by means of a grid adaptive inside the same polygon containing the whole landslide area. DEMs allowed us to generate correspondent orthophotos related to the three years too.
By using the difference of DEMs in a GIS environment it has been possible to recognize areas affected by uplift (accumulation zone) or lowering (depleted zone), then to estimate for every geomorphological unit the altimetry variation during the time considered. Moreover, the volume of the material involved in the movement can be estimated by multiplying the difference of altimetry by reduced or accumulated area sizes for every couple of years. The results obtained allowed both a geometric characterization of the landslide body and the dynamic development of the one.
In the landslide area, some electrical resistivity tomographies have been carried out to reconstruct the geometrical setting of the subsoil, then to detect the sliding surface and estimate the thickness of the landslide that could be involved in future reactivation. This information is very useful and necessary to better plan the mitigation operations.