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Laser scanner and geophysical techniques as a non-destructive terrestrial tool for landslide diagnostics: the example of Perarolo di Cadore landslide (Italy)

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The integration of new remote sensing techniques in topography with geophysical surveying allows to obtain a complete picture about landslide geometry and kinematics. In particular, the coupling of laser scanner and seismic surveys proved to be a good diagnostic approach for landslide studies.

Laser scanner is a relatively new remote technique in topographical surveys and it has been only recently introduced in the monitoring of landslide displacements, but its potentialities are very promising because it allows to remotely acquire high-definition surface data with accuracies comparable to other punctual traditional methods, such as GPS and total station. Laser scanner acquires the position of a large quantity of points, even millions, and allows the direct construction of digital surface models without requiring the positioning of bases or benchmarks on the landslide for measures.

The refraction seismic tomography from velocity, seismic attenuation pattern and terrain quality evaluation has produced fundamental information about the geological and geotechnical parameters of the involved mass which is useful to define the sliding surface and slope conditions.

This new technical approach was successfully applied to the S. Andrea landslide, (Perarolo di Cadore, Eastern Alps, Italy), a particularly active and high risk phenomenon that threatens the hamlet of Perarolo and the Boite River, which could be dammed if a sudden sliding occurred. The execution of multitemporal scans allowed the comparison between two or more landslide models and therefore the correspondent dis-

placement field could be evaluated. By combining the displacement fields at surface derived from laser scanner modelling with the underground geological assessment resulting from the refraction seismic survey, a correct geological model and mechanism of the landslide was obtained. The geological model has been calibrated on the base of geological survey data integrated with geotechnical and geophysical measurements resulting both from surface analysis and borehole logs. In the future, the elaboration of these data, by using a finite difference analysis, will allow the formulation of possible evolutionary scenarios of the instability phenomenon studied and will permit to plan the most suitable and efficient countermeasures.

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