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The large San Vito Romano (central Italy) landslide system 3D geological-technical model

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On large landslide areas, two-dimensional and three-dimensional geological-technical models realization require a large number of subsurface data.

We investigate a complex landslide system located in San Vito Romano, Central Italy, 40 km east from Rome where a large number of boreholes, piezometers and geophysical surveys are available.

The purpose of this work is the San Vito Romano landslide characterization in order to create a simplified graphic 3D model and to support a monitoring plan. The aim is also to support local authorities in civil protection activities.

The geological context is characterised by a Tortonian sequence of turbidite deposits, characterised by marls and arenaceous intercalations, forming a monocline with 15-20° dip-direction eastward, parallel to slope inclination. Moreover, a complex hydrogeological system characterises the groundwaters.

This landslide has a spatial extent of about 0.5 km^2 and it has been studied for lot of years. It affects San Vito Romano's new town (built from the 60s) and it has been interpreted as a large rock translational slide. From a geomorphological point of view the village is located along a cuesta. Human activities consist in buildings, roads and public services, built over the years, even in the recent past.

A multitude of technical reports were carried out in this area during the last decades: geological surveys for building projects, geotechnical surveys for landslide monitoring planning, academic studies and field survey to understand the geomorphological slope evolution, hydrogeological and geophysical survey.

All the available surveys were censored in order to create a large database in GIS environment. The database containing all the information from 80 linear and punctual surveys.

Therefore, a boreholes surveyed quick interpretation was carried out. First, the stratigraphy was simplified into three different lithological units: loose material belonging to the landslide, bedrock involved in the gravitational process and bedrock in place. The stratigraphic and geotechnical data were implemented by the seismic data.

A Digital Terranean Model was created using contour lines and elevation points from a 1:2000 scale local topographic map.

All available data has been entered into AutoCAD Map 3D and georeferenced in GIS environment. 7 E-W and 8 S-N cross sections were realized allowing a first two-dimensional landslide system interpretation. Finally, the cross sections were correlated to create a single simplified three-dimensional subsurface model.

This model shows at least three surfaces of rupture at different depth and the geological setting of the wide translation slide. Moreover, it could be implemented with new data and it could be imported into slope stability and hydrogeological modelling software for numerical analysis.