Geophysical Research Abstracts
Vol. 20, EGU2018-18253-2, 2018
EGU General Assembly 2018

Unravel the Camugnano deep-seated slow-moving rockslide (northern Apennines, Italy) by an integrated programme of site investigation and multi-platform monitoring

Alessandro Corsini (1), Marco Mulas (1), Giuseppe Ciccarese (1), Matteo Berti (2), Benedikt Bayer (2), Alessandro Simoni (2), Giuseppe Caputo (3), Matteo Bernardi (3), and Anna Rita Bernardi (3)

(1) University of Modena and Reggio Emilia, Department of Chemical and Geological Sciences, Modena, Italy (alessandro.corsini@unimore.it), (2) University of Bologna, Department of Biological, Geological and Environmental Sciences, (3) Emilia Romagna Region, Agency for Territorial Safety and Civil Protection - Service Area Reno and Po di Volano

The Camugnano landslide, located in the northern Apennines of Italy (Province of Bologna), is causing widespread damages to province and local roads and to tens of houses in the homonymous village. Specifically, phases of acceleration of movements (still in the range of slow movements) causing sudden worsening of the damaging scenario are reported for 1934, 1939, 1941, 1970, 1985, 2013. For such a reason, in 1935 Camugnano was classified as “village to be consolidated according to National Law 445/1908" (Royal Decree n.1966/35) and in 1998 the "site perimetration" was approved by the Regional Authority (DGR.n.1161/98).
Soon after the last acceleration event of 2013, which caused interruption of traffic on roads and evacuation of some houses, universities and public offices started a joint effort to exploit traditional and innovative mapping, investigation and site to remote sensing monitoring methods in order to unravel the geologic, geomorphic, geomechanical and kinematics characteristics of the Camugnano landslide.
Results obtained, point to deep-seated continuously slow-moving rockslide affecting coarse to fine grained sandstones overlaid to claystone, displaying a complex and composite style of movement, characterized by multiple landslide elements (evidenced by Lidar-supported mapping, boreholes and refraction and reflection seismic profiles), multiple active shear surfaces (down to the depth of 55 m, as evidenced by inclinometers) and rates of movements ranging in the order of few to some cm/year (mostly steady throughout the year, with slight acceleration in winter, as evidenced by periodic D-GPS and satellite interferometric monitoring), in response to groundwater levels that are yet to be fully defined (as systematic continuous piezometric monitoring only started in 2017).
Lesson learned so far, is that the studies and existing cartography produced prior to the 2013 acceleration, failed to fully recognize the characteristics of the landslide, which was in turn misinterpreted in terms of extension as well as type and depth of movements. This led, during the 1980’s and 90’s, to incomplete site borehole campaigns (which were erroneously limited to few tens of meters depth) and uneffective consolidation projects (limited to surface drainage works). As a matter of fact, all the pieces of information collected from 2013 to date, allow us to delineate geologic-geomorphic maps and representative cross sections of the phenomenon that clearly indicate that the task “village to be consolidated” is probably much more complicated than previously expected. Thus, for next time being, a further implementation of monitoring using a Robotic Total Station is on its way, with the aim to highlight unsteady movement rates that, so far, have not been revealed by periodic monitoring. In perspective, and if conditions will allow, early warning might possibly be a feasible solution for risk reduction if people is the element at risk to be considered.