Geophysical Research Abstracts
Vol. 14, EGU2012-10209-2, 2012
EGU General Assembly 2012

A flexible system of remediation to stabilize a road affected by landslide in the area of Val di Maso (North-Eastern Italian Apls)

G. Tessari (1), C. Cioli (1), M. Floris (1), G. Stevan (2), and R. Genevois (1)

(1) Department of Geosciences, University of Padua, Padua, Italy (giuliatex@yahoo.it), (2) Soil Protection Division, Province of Vicenza, Vicenza, Italy

Slope stabilization follows different design procedures and approaches finalized to reduce the driving forces or increase resisting forces or avoid the problem at all by completely or partially remove unstable materials. But often the cost of stabilization works is very high. Therefore it is necessary to find new effective solutions with low or moderate costs.
In this frame, this work reports the case study of a road in the area of Val di Maso, located in the North-Eastern Italian Alps. The road is threatened by the evolution of a mass movement occurred on November 2010 due to an extreme rainfall event that hit the entire North-Eastern sector of Italy. The complex landslide consists of a debris flow involving eluvial/colluvial deposits and past landslide debris. In the upper part, clear morphological evidences indicate that the instability is rapidly retrogressing by multiple rotational slides involving volcanic deposits that can be referred to a paleo-landslide. In the crown area, unstable materials have a thickness of around 20 m. For this reason, a stabilization system using rigid structures anchored to the stable bedrock for an appropriate length would be burdensome and costly.
Starting from the geological model of the unstable slope, an innovative stabilization solution is proposed, a numerical simulation to analyze the effects of the stabilization is performed and an integrated monitoring system to control and verify the slope behaviour is planned.
The proposed remediation works consist of a “floating belt”, placed close to the edge of the road, and some “floating anchors” some meters further down behind the main scarp of the landslide. The system allows small displacements to induce a stress re-distribution favourable to the stability of the slope. The main advantages of the proposed solution are the adaptability to different geo-environmental situations and the low cost compared to other alternatives.
On the basis of field data collected, a geological-technical model of the slope has been defined and the behaviour of the slope after the placement of the flexible structures has been simulated using FLAC, a two-dimensional explicit finite difference software. The feasibility of reproducing complex soil-structure interactions with these analyses has been considered.
To verify performance and effectiveness of the innovative solution, a monitoring system integrating different techniques has been designed. The system consists of: load cells located in correspondence to the stabilization structures to measure variation of soil load; inclinometers to detect deep displacements; extensometers and a topographic net, integrated with GPS points, to measure superficial displacements. Finally, the feasibility of a monitoring using Differential Synthetic Aperture Radar Interferometry (DInSAR) techniques will be tested.