Geophysical Research Abstracts
Vol. 12, EGU2010-6446, 2010
EGU General Assembly 2010

How multiple-foliations may control large gravitational phenomena: the case at the High Cismon Valley (Eastern Trentino, Italy)

Luca Zorzi (1), Matteo Massironi (1), Nicola Surian (2), and Mario Floris (1)

(1) Department of Geosciences, University of Padua, via Giotto 1 – 35137 Padova (Italy);, (2) Department of Geography "G.Morandini", University of Padua, via del Santo 26 – 35137 Padova (Italy)

The right slope of the High Cismon Valley (Trento Province, Italy), carved within the multiple-foliated phyllides of the Southalpine Basement, shows evidence of a differential quaternary slope evolution which highly depends on how the slope intersects the inherited structures. Indeed in the studied area, the regional schistosity draws a kilometric-scale NNW trending fold, with close flanks and an axial plane dipping to the SE. The structure obliquely intersects the NNE-SSW trending slope so that its northern part follows the upper flank of the fold and the southern sector is partly coincident with the fold hinge. As usual, the secondary axial-plane foliation is incipient at the fold flanks and much more penetrative and fan-shaped approaching the hinge zone. This has significant consequences on rock mass mechanical properties and on mechanisms and timing of the gravitational phenomena developed along the slope.

In particular the JCS and GSI, obtained on stable outcrops, display a decrease going from north to south, pointing out the progressive deterioration of the rock mass strength which directly reflects the influence of the pre-existing fabric.

The results obtained by the LiDAR-derived digital elevation model analysis showed evidence of two different gravitational movements, located in the northern and southern sector of the slope respectively. The northern side is characterized by an ongoing Deep-Seated Gravitational Slope Deformation (DSGSD) likely triggered by the post-glacial unloading, derived from the retreat of the ice tongue that covered the Cismon Valley during the Last Glacial Maximum (LGM). By contrast, the southern part of the slope is the expression of a fully evolved pre-LGM gravitational collapse.

Considering that the regional schistosity seems to control in both cases the basal sliding horizon, this heterogeneous behavior of the slope is most likely controlled by the secondary foliation which is of paramount importance for the release of the mobilized mass at the crown area. Actually its presence or absence may respectively allows or impedes the development of crown cracks and related morphostructures.

Although it is widely accepted that the regional foliation is the dominant controlling factor of Deep-Seated Gravitational Slope Deformations (DSGSDs) on poly-deformed and highly foliated metamorphic basement, our work suggests that also the secondary foliation may reach a critical importance on slope evolution if favorably oriented and sufficiently penetrative.