Geophysical Research Abstracts
Vol. 13, EGU2011-10865-1, 2011
EGU General Assembly 2011

Inherited structures and slope evolution: the case of the left slope of the Ridnaun Valley.

Luca Zorzi (1), Matteo Massironi (1), Rinaldo Genevois (1), Stefan Schneiderbauer (2), and Volkmar Mair (3)

(1) University of Padova, Department of geoscience, Padova, Italy (luca.zorzi.1@studenti.unipd.it), (2) EURAC – Institute for Applied Remote Sensing, Via Esperanto, 3, 39100 Bolzano, Italy. , (3) Ufficio Geologia e Prove Materiali, Provincia Autonoma di Bolzano, Via Val d'Ega 48, I – 39053 Cardano (Bolzano), Italy

The left slope of the Ridnaun Valley (Sterzing/Vipiteno, South Tyrol, Italy), set on the crystalline units of the Austoalpine Nappe of the alpine orogenic wedge, shows evidence of quaternary gravitational evolution which highly depends on the interaction between the slope trend and the brittle/ductile structural setting. The slope is carved within the paragneisses rocks of the Oetztal - Stubai Unit and the micaschists of the Schneeberg Unit. These two units are separated by a NNW gentle dipping tectonic contact (mylonites and cataclasites), which obliquely intersects the E–W slope, and is well described by ultracataclasitic layers following the regional low angle north-dipping schistosity. Folds with sub-horizontal E–trending axes induce the change in the dip direction of the regional schistosity from N dipping to SE dipping. NNE–SSW and N–S trending faults, having a mean 1m thick incoherent fault breccia, affect the entire slope. These, as well as the folds and the ultracataclastic layers, has significant consequences on rock mass mechanical properties and on mechanisms and timing of the gravitational phenomena that developed along the slope.

The results obtained by field work and the analysis of the LiDAR-derived digital elevation model clearly revealed different gravitational movements. A fully evolved gravitational collapse, having the typical features of a Rock Avalanche (RA), characterizes the central part of the slope; whereas to the east and west of the RA, deep seated gravitational slope deformations still involve the slope. The RA, whose deposit covers an area of about 2.4 km2, had obstructed the valley, resulting in a rock avalanche – dammed lake. This has been breached and run out at an interval of time not yet defined. An ongoing gravitational deformation involves the uphill sections of the slope, next to the crown area. In addition, to the west and east of the RA, morphostructural features as double ridge, scarps – counterscarps, trenches are evident. PS and DS - SAR (Synthetic Aperture Radar) interferometry data (derived ERS, ENVISAT and RADARSAT scenes), generated by the Tele-Rilevamento-Europa (TRE) and provided to the EURAC-Institute for Applied Remote Sensing for the EU-FP7 Project 'SAFER', with the purpose of an integration of the Inventory of Landslide Phenomena in Italy (IFFI Project), testify an ongoing movement on both the DSGSDs bordering the RA, highlighting a most unstable area at the western sector.

The heterogeneous behavior of the slope is most likely controlled by the interaction between the ductile and brittle structures: on one hand the folds coupled with the non–parallelism between the tectonic contact trend and the slope, ease the DSGSD formation and evolution and act as releasing factor for the RA crown area. On the other hand, the recognized fault network act as the lateral release of the unstable areas, and play a major role as a predisposing factor for gravitational failures because of the increasing degree of damage approaching each principal fault.