Geophysical Research Abstracts
Vol. 18, EGU2016-15231, 2016
EGU General Assembly 2016

Karstic slope "breathing": morpho-structural influence and hazard implications

Roberto Devoti (1), Emanuela Falcucci (1), Stefano Gori (1), Maria Eliana Poli (2), Adriano Zanferrari (2), Carla Braitenberg (3), Paolo Fabris (4), Barbara Grillo (3), and David Zuliani (4)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Roma, Italy (roberto.devoti@ingv.it), (2) Università di Udine, Italy, (3) Università di Trieste, Italy, (4) Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Udine, Italy

The study refers to the active slope deformation detected by GPS and tiltmeter stations in the Cansiglio karstic plateau located in the western Carnic Prealps (NE Italy). The observed transient deformation clearly correlates with the rainfall, so that the southernmost border of the Plateau reacts instantly to heavy rains displaying a “back and forth” deformation up to a few centimeters wide, with different time constants, demonstrating a response to different catchment volumes. We carried out a field survey along the southern Cansiglio slope, to achieve structural characterization of the relief and to verify the possible relation between structural features and the peculiar geomorphological setting dominated by widespread karstic features.
The Cansiglio plateau develops on the frontal ramp anticline of the Cansiglio thrust, an about ENE-WSW trending, SSE-verging, low angle thrust, belonging to the Neogene-Quaternary front of the eastern Southern Alps. The Cansiglio thrust outcrops at the base of the Cansiglio plateau, where it overlaps the Mesozoic carbonates on the Miocene-Quaternary terrigenous succession. All along its length cataclastic limestone largely outcrop.
The Cansiglio thrust is bordered by two transfer zones probably inherited from the Mesozoic paleogeography: the Caneva fault in the west and the Col Longone fault in the east. The carbonatic massif is also characterized by a series of about northward steeply dipping reverse minor faults and a set of subvertical joints parallel to the axes of the Cansiglio anticline.
Other NNW-SSE and NNE-SSW conjugate faults and fractures perpendicular to the Cansiglio southern slope are also identified. This structural setting affect pervasively the whole slope and may determine centimetre- to metre-scale rock prisms.
Interestingly, along the topmost portion of the slope, some dolines and swallow holes show an incipient coalescence, that trends parallel to the massif front and to the deformation zones related to the reverse fault. Such a dolines alignment forms a ridge parallel elongated trench, about 4 km long, which is a typical morpho-structural feature of slopes undergoing large scale gravitational instability (deep seated gravitational slope deformations). The trench is interrupted towards the NE by several coalescent and slide scarps. Such geomorphic evidence testifies to the occurrence of landslides events (mainly rockslides and rock falls) that sourced from the top portion of the slope, as local collapses of the sector affected by the trench.
Our observations, as a whole, suggest that morpho-structural framework of the Cansiglio south-eastern slope is highly influenced by tectonic features related to the complex tectonic deformation. The structural setting is locally favoring the nucleation of karstic landforms (dolines, swallow holes and ipokarstic features). Moreover, the presence of widespread tectonic features lead gravitational instability affecting the slope, linked to the high local relief of the mountain front, may trigger collapse of sectors of the slope in rock falls phenomena. In this perspective, therefore, the continuous “back and forth” movements of the slope observed by GPS time series analysis induced by rainfall may progressively weaken the slope and render it prone to landsliding.