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Interactions between recent tectonic activity and the evolution of mountain relief of the Inner Cottians Alps (Western Alps): preliminary morphotectonic map.

Marco Bacenetti (1), Michele Morelli (2), Paola Cadoppi (1,3), Marco Giardino (1,3), Luigi Perotti (1,3), and Gianluigi Perrone (1)

(1) Department of Earth Sciences, University of Torino, Italy (marco.bacenetti@unito.it), (2) ARPA Piemonte, Torino, Italy, (3) NatRisk Interdepartmental Research Centre, University of Torino, Italy, (www.natrisk.org)

Possible interactions between recent tectonic activity and the evolution of mountain relief have been investigated at the regional (1:50,000) and local (1:5,000) scale in the Germanasca Valley (Cottian Alps, NW-Italy) through an integrated, multidisciplinary approach combining Structural analysis, Quaternary Geology, Geomorphology and Geomatics.

The inner edge of the Cottians Alps and the adjacent Po Plain are among the most densely populated portions of the Piemonte Region (NW-Italy). This area corresponds to the junction between the Alpine and Apennine chains and it is affected by a diffuse low- to moderate- seismicity (Ml<5) and hypocenters at a shallow crustal level (< 20 Km). Available apatite fission track data indicate that this sector reached shallow crustal levels, where brittle deformation mechanisms prevail since Late Oligocene times. Historical earthquakes (e.g. Prarostino's earthquakes, 1808 Ml=5.5; Cumiana's earthquakes, 1980 Ml=4.8) caused both material and social damage in the area.

Since faults activity is often associated with characteristic geomorphological features, linear valleys, ridgelines, slope-breaks, steep slopes of uniform aspect, regional anisotropy and tilt of terrain, have been detected in the area. Analysis of digital elevation models, by means of numerical geomorphology, provides a tool to recognize linear features and characterizing the tectonics of an area in a quantitative way. Geomorphology and morphotectonic analyses have been performed using digital orthophotos (AGEA Orthophoto 2009), aerial stereo couples and DEMs (LiDAR5x5 meters, Regione Piemonte 2009). The morphotectonic lineament analysis was conducted using TerraExplorer® Software Systems, Inc. For the field mapping activities, it was used an application called "SRG2" (Support to Geological / Geomorphological Surveys), an extension for ArcPad (ESRI mobile GIS). Into ArcPad, the SRG2 application adds a toolbar made up of several functions for a useful mapping and classification of geological/geomorphological features.

Currently, all data collected were included in a GIS project in order to obtain a preliminary morphotectonic map whose interpretation showed a significant tectonic uplift of the area. Data verified the existence of strong geomorphological anomalies which affected the stream network, the slope morphology and the distribution of Quaternary deposits.Results are particularly important for this sector of the Alps, where "active structures", capable of generating earthquakes of this magnitude, have not been identified so far.