Geophysical Research Abstracts, Vol. 9, 05530, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05530

Mapping fault-zone architecture along a major Alpine wrench lineament: the Pusteria Fault

A. Bistacchi (1), M. Massironi (2) and L. Menegon (2)

Dipartimento di Scienze Geologiche e Geotecnologie, Università di Milano Bicocca, Piazza della Scienza 4, 20126 Milano, ITALY, (2) Dipartimento di Geoscienze, Università di Padova, Via Giotto 1, 35137 Padova, ITALY (andrea.bistacchi@unimib.it / Fax 02/64482073, Phone 02/64482093)

The E-W Pusteria (Pustertal) line is the eastern segment of the Periadriatic lineament, the >600 km tectonic boundary between the Europe and Adria-vergent portions of the Alpine Collisional Orogen (Dal Piaz et al., 2003). The Periadriatic lineament is characterized by a transcurrent polyphase activity of Tertiary age, and is marked by an array of calcalkaline to shoshonitic magmatic bodies, which points to a deep root (Rosenberg, 2004), also testified by the recent TRANSALP seismic transect (Castellarin et al., 2006).

At the map scale, the western edge of the Pusteria line is characterized by a complex network of generally transcurrent brittle fault zones, interconnected by a full spectrum of transtensional and transpressional features related to releasing and restraining bands respectively. An older ductile/brittle activity can be recognized for some segments thanks to their relationships with a strongly tectonized Oligocene tonalite/diorite body (Mules tonalitic "lamella"), emplaced along the Pusteria line, and minor related dikes (Mancktelow et al., 2001). Younger fault zones, such as the Sprechenstein-Val di Mules line, crosscut the Pusteria line and show a dextral activity which is compatible with a kinematic linkage between the dextral Pusteria system and the extensional Brenner fault, outcropping to the NW (Bistacchi et al., 2001).

During its polyphase activity, this fault network developed a quite complex architecture, showing different kinds of damage zones (more or less fractured, and with different characteristics related to the host rock, the position in the fault network, etc.) and core zones (single/paired/multiple cores; different fault rocks depending on the host rock, deformation duration, finite strain, and hydrothermal fluid flow along different segments).

In this paper we show the first results of a detailed mapping project at the 1:5.000 and 1:2.500 scale which, apart from a traditional reconstruction of geology, fault offsets, kinematics, and relative ages of different segments, takes into account the spatial distribution of fault rocks in core zones and the degree and characteristics of fracturing (e.g. joint spacing and number of joint sets) in damage zones. As regards the quantitative characterization of damage zones, a new description schema, partly inspired by engineering geology classifications, is proposed.

The results of this work are implemented in a 3D structural model (developed with gOcad), allowing the study of the complex relationships among the various structural and lithological parameters which concur in the development of the fault-zone architecture, and particularly the interrelationships between the degree of "maturity" of different fault segments, their kinematics, the types of fault rocks developed in fault cores and the structural features encountered in damage zones.

References

Bistacchi A., Massironi M., Brandner R., Dal Piaz G:V:, Monopoli B., Schiavo A., 2001. The Sprechenstein-Maulser tal line: a new transfer fault of the Periadriatic system, eastern Alps south of the Tauern Window. Geologisch-Palaeontologische Mitteilungen Innsbruck, Band 25, pp. 43-44.

Castellarin A., Nicolich R., Fantoni R., Cantelli L., Sella M., Selli L., 2006. Structure of the lithosphere beneath the Eastern Alps (southern sector of the TRANSALP transect). Tectonophysics 414, 259-282.

Dal Piaz G.V, Bistacchi A., Massironi M., 2003. Geological outline of the Alps. Episodes, 26 (3), pp. 174-179.

Mancktelow N.S., Stöckli D., Grollimund B., Müller W., Fügenschuh B., Viola G., Seward D., Villa I.M., The DAV and Periadriatic fault systems in the Eastern Alps south of the Tauern window. Int.J. Earth Sciences 90, 593-622.

Rosemberg C.L., 2004. Shear zones and magma ascent: A model based on a review of the Tertiary magmatism in the Alps. Tectonics, vol. 23, TC3002, doi:10.1029/2003TC001526.