



Late Alpine deformation in the Como region (central Southern Alps, Northern Italy)

L. Cardinetti (1), A. Viganó (1), S. Martin (1), M. Zattin (2) and M. G. Malusá (3)

(1) Dipartimento di Scienze Chimiche, Fisiche e Matematiche, Università dell'Insubria, Via Valleggio 11, 22100 Como, ITALY (2) Dipartimento di Scienze della Terra e Geologico-Ambientali, Università di Bologna, Bologna, ITALY (3) CNR - Istituto di Geoscienze e Georisorse, sezione di Torino, Torino, ITALY

laura.cardi@tiscali.it / Phone: 031326212

During the Neogene, the development of south - vergent thrusts, involving the whole Lombardian Mesozoic foothill between Lake Garda and Varese caused the regional N - S directed shortening of the external belts of the central Southern Alps.

In particular, the Como area is characterized by the presence of the north - vergent Monte Olimpino thrust, interpreted as a back - thrust joined to the main south - vergent belt (Bernoulli *et alii*, 1989). This thrust involves both the underlying Mesozoic Moltrasio Limestone and the Late Oligocene - Early Miocene Gonfolite Lombarda Group rocks. This deformational event and the exhumation and cooling of the Gonfolite Lombarda Group rocks seem to be Early Burdigalian in age (about 19 My) according to new apatite fission track data (Chiasso Fm. and Como Conglomerate Fm. - Gonfolite Lombarda Group: 19 - 20 My; Cardinetti, 2004). Cooling ages are in fact rather younger than sedimentation ages which are 34/33 - 28 My in the underlying Chiasso Fm. (Gelati *et alii*, 1988) and 28.8 - 25/24 My in the overlying Como Conglomerate Fm. (Gelati *et alii*, 1988). These geochronological results suggest that both formations were buried down to 3 - 4 km in depth before Burdigalian, in order to allow the apatite resetting, and then exhumed.

In correspondence of the southern termination of Lake Como, the Monte Olimpino thrust is cut across by a WNW - ESE graben - like structure, evidenced by fracture planes. This morphostructure is 1.5 km wide and runs for at least 12 km, through the town of Como, from the lower Breggia valley to the northwest, to the Montorfano

lake to the southeast. It's filled by Quaternary glacial and fluvioglacial deposits and clockwise rotated of about 34° compared to the orientation of the frontal edge of the Monte Olimpino thrust.

In a well - log in Como town, below glacial and fluvioglacial deposits, a clayey layer has been found above the Gonfolite bedrock, at a depth of 180,50 m. It has been supposed to be Pliocene in age, according to the age of the basal terms of the sedimentary filling preserved in the lower Breggia valley, where Early Pliocene clays (Felber & Bini, 1997) cover Messinian conglomerates (Pontegana conglomerates, 6.5 - 5.3 My; Zanchi *et alii*, 1995; Zanchi *et alii*, 1997).

This graben - like structure can be correlated with western similar parallel morphologic structures observed in the Varese region (Brambilla & Lualdi, 1988), and can be therefore interpreted and discussed in a more general picture of the central - western Alps, where extensional faults strongly influenced the late alpine evolution (e.g. Hubbard & Mancktelow, 1992).

REFERENCES

Bernoulli D., Bertotti G., Zingg A. (1989) Northward thrusting of the Gonfolite Lombarda ("South-Alpine Molasse") onto the Mesozoic sequence of the Lombardian Alps; implications for the deformation history of the Southern Alps. *Eclogae geologicae Helvetiae*, 82, 841-856.

Brambilla G., Lualdi A. (1988) Il Pliocene della Valle Olona (Varese, Italia NW) nelle Collezioni Sordelli 1874-79, Parona 1883 e Nangeroni 1928. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano*, 129, 5-32.

Cardinetti L. (2004) Rilevamento geologico e analisi ambientale della Gonfolite Lombarda nell'area di Como. Degree thesis, Università dell'Insubria, Como, 198 pp.

Di Giulio A., Carrapa B., Fantoni R., Gorla L., Valdistorlo A. (2001) Middle Eocene to Early Miocene sedimentary evolution of the Western Lombardian segment of the South Alpine foredeep (Italy). *International Journal of Earth Sciences*, 90, 534-548.

Felber M., Bini A. (1997) Seismic survey in alpine and prealpine valleys of Ticino (Switzerland): evidences of a late-tertiary fluvial origin. *Geologia Insubrica*, 2, 46-67.

Gelati R., Napolitano A., Valdistorlo A. (1988) La Gonfolite Lombarda; stratigrafia e significato nell'evoluzione del margine sudalpino. *Rivista Italiana di Paleontologia e Stratigrafia*, 94, 285-332.

Gelati R., Napolitano A., Valdistorlo A. (1992) Results of studies on the Mesozoic succession in the Monte Olimpino 2 tunnel; the tectono-sedimentary sig-

nificance of the Gonfolite Lombarda. *Rivista Italiana di Paleontologia e Stratigrafia*, 97, 565-598.

Gianotti R., Perotti C.R. (1986) Introduzione alla tettonica e all'evoluzione strutturale delle Alpi Lariane. *Memorie della Società Geologica Italiana*, 32, 67-99.

Hubbard M., Mancktelow N.S. (1992) Lateral displacement during Neogene convergence in the western and central Alps. *Geology*, 20, 943-946.

Laubscher H.P. (1985) Large-scale, thin-skinned thrusting in the southern Alps; kinematic models. *Geological Society of America Bulletin*, 96, 710-718.

Zanchi A., Rigamonti I., Felber M., Bini A. (1995) Evidenze di tettonica recente e di glaciottettonica nel Mendrisiotto (Ticino Meridionale, Svizzera). *Il Quaternario*, 8, 279-290.

Zanchi A., Bini A., Felber M., Rigamonti I., Uggeri A. (1997) Neotectonic evidences along the Lombardian foothills of S-Alps. *Geologia Insubrica*, 2, 99-112.