



Late Oligocene and Neogene kinematics of convergence at plate boundaries in the Eastern Central Alps : insights from shear zone patterns in metagranites from the European and Adriatic plates in the vicinity of the Insubric Line

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How the Tertiary convergence between the Adriatic subplate and the stable European foreland has been accommodated by deformation along the Insubric Line (Periadriatic Fault System) in the Eastern Central Alps remains a matter of debate. This study provides new insights into the kinematics and timing of deformation along the plate boundaries, during the late Oligocene and Neogene.

Granitic rocks initially have a bulk homogeneous and "isotropic" texture and represent good analogues for the study of the rheological behaviour of the continental crust. Heterogeneous strain, reflected by patterns of anastomosed and conjugated ductile shear-zones, and brittle fault population analyses in granites provide useful paleostrain/stress indications to constrain the bulk kinematics during continental deformation. Ductile shear zone patterns have been used as reliable and large scale shear criteria and strain markers (e.g. Gapais et al., 1987). In the brittle field, fault-slip analysis inversion methods are used to derive principal stress and strain axes orientation (e.g. Angelier, 1984). In this study, methods of fault-slip analysis are applied to brittle-ductile deformation fields. The resolved incremental principal strain axes are compared to the finite strain axes deduced from classical strain analyses (via schistosity-stretching lineation couples).

The brittle and brittle-ductile heterogeneous deformation of granitic rocks at mid-crustal levels in the vicinity of the Insubric Line is investigated and compared:

- in the 30 Ma old Sondrio intrusion (Giger, 1991), which occurs immediately north of the Insubric Line, in the mylonitised Upper Austroalpine series;
- in the Dazio metagranite of the South Alpine basement rocks, which occurs immediately south of the Insubric Line.

The symmetrical/asymmetrical patterns versus schistosity, lineation and P-T strain axes are used as large-scale kinematic indicators and discussed in terms of coaxiality/non-coaxiality of the deformation.

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Gapais, D., Bale, P., Choukroune, P., Cobbold, P., Mahdjoub, Y. and Marquer, D. (1987). Bulk kinematics from shear zone patterns: some field examples. *J. Struct. Geol.*, 9(5/6), 635-646.

Giger, M. (1991). Geochronologische und petrographische studien an Geröllen und Sedimenten der Gonfolite-Lombarda Gruppe (Südschweiz und Norditalien) und ihr Vergleich mit dem alpinen Hinterland. Bern, Universität Bern: 227 p.