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Spatial and temporal variations of bulk kinematics during continental convergence (subduction-collision): Shear zone and fault patterns in granites along the Swiss eastern Alpine seismic profile (NFP-20 East)

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Granitic rocks initially have a bulk homogeneous and "isotropic" texture and represent good analogues for the study of the rheological behavior of the continental crust. Heterogeneous strain, reflected by patterns of anastomozing and conjugated ductile shear-zones, and brittle fault populations analyses in granites provide useful paleostrain/stress indications to constrain the bulk kinematics during continental deformation. The 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). The use of classical methods of fault-slip analysis are not well-developed at the brittle-ductile transition. In this study, the different advanced 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).

This study is integrated in a wide thematic project focused on the use of shear zone and fault patterns in metagranites to understand the deformation and kinematics in different tectonic units along the NFP20-East seismic profile of the Alps. On this profile, the metagranite deformation is used as a strain and kinematic indicator in the External Crystalline Massifs (European margin), in the Upper Penninic nappes (Briançonnais domain), in the late alpine intrusions (Bergell, Novate and Sondrio intrusions) and in the South-Alpine basement (Apulian plate). In the different intrusions, the symmetri-

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

Shear zone patterns study in metagranites is an important tool to interpret the bulk alpine kinematics at large scale in different tectonic units deformed from 50 to 15 Ma. These studies also bring new knowledge about the mechanical behaviour of the continental crust, which is mainly controlled by heterogeneous deformation at different stages of the mountain building processes (subduction/collision).