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New constraints on the brittle deformation in the Lepontine Alps, from paleostress and pseudotachylites analyses.

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The main updoming of the Lepontine Gneiss dome started some 32-30 Ma ago with the intrusion of the Bergell tonalites and granodiorites, concomitant with dextral strike-slip movements along the Tonale and Canavese Lines (Argand's Insubric phase) (Steck and Hunziker, 1994). Subsequently, the center of the main updoming has migrated slowly to the west, reaching the Simplon region some 20 Ma ago. The ductile and semi-ductile history of this Oligocene-Miocene basement unit begins to be well documented contrary to the brittle post-nappe tectonics that still remains underexplored.

Thus, the brittle structural pattern of the Lepontine dome was, in a first step, investigated using images processing. The raw data were subjected to various operations (mosaiking, georeferencing, balancing, histogram adjustements, hillshade different kinds of filters…). Among these, spatial edge enhancement filtering emphasizes high frequency textural patterns, allowing detection of linear discontinuities evidenced by abrupt tonal changes.

These lineaments have also been cross-controlled in the field in order to check the mode of their formation (tectonic, gravitational…). Many fault planes show different mineralizations and contain pseudotachylites, which also yield information on the conditions of development of the fault pattern. Indeed, optical as well as electron microscopy reveals that optically isotropic matrix of the studied pseudotachylites may contain glass. Fresh glass with unequivocal textural indications is rare. Nevertheless,

it can occur in the interstices between relict feldspar grains in some host rock clasts embedded in the pseudotachylite matrix. The glass is strongly enriched in K, depleted in Ca and Na. Its typical quench products include potassium feldspar, biotite and magnetite. Glass in the matrix of the host pseudotachylite can be altered during postcrystallization processes and does not show clear quench textures

To characterize the regional paleostress field(s), a fault/stria analysis based on classical inversion methods was carried out. It provided important insights into the processes linking the study area to neighbouring areas (Wawrzyniec & Selverstone, 2001, Champagnac et al., 2005, Grosjean et al, 2004), as well as into the relationship with the tectonics of the major bounding structures such as the Simplon low-angle normal fault to the west (Mancktelow 1990), the Forcola fault to the east (Nievergelt et al., 1996; Ciancaleoni et al, in prep.), and the Insubric line to the south (Schmid et al. 1989).

0.1 References

Ciancaleoni *et al*, Tectonics, *in prep*.

Champagnac *et al*, 2005, *Tectonics, submitted.*

Grosjean *et al*, 2004, *EGH, 97, 33-46.*

Mancktelow, 1992, *Tectonophysics.*, 215, 295-317.

Nievergelt *et al.*, 1996 *Tectonics,* 15, 329-340.

Schmid *et al.*, 1989, *Geol. Soc. Spec Publ.*, 45, 153-171.

Steck and Hunziker, 1994, *Tectonophysics, 238, 229-254.*

Wawrzyniec & Selverstone, 2001, *Tectonics*, 20, 748-770.