

Transient frictional melting in the ductile field: a record of deep earthquakes

Giorgio Pennacchioni

A conundrum of structural geology is the association of coeval pseudotachylytes (solidified friction-induced melts associated with seismic slip of faults) and mylonites (resulting from dominant creep processes in the regime of crystal-plasticity). The study of this association in exhumed rocks can provide information on the mechanics of deep-seated earthquakes. The proposed PhD project focuses at studying different world-wide examples of exhumed pseudotachylyte-bearing mylonites developed during high-grade metamorphism. The detailed field analysis of selected well-exposed outcrops will be complemented with the microstructural/mineralogical/petrographical investigations (FEG-SEM, TEM, SEM-cathodoluminescence; EMP, SIMS; X-ray goniometry; EBSD; XRF; XRPD) of representative samples aiming at deciphering the deformation mechanisms and the ambient conditions of deformation. The collected dataset will be used to constrain models of cyclic development of seismic slip in the ductile field.