

## Frozen in a Flash: Pseudotachylites as Records of Cyclic Seismic Slip

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**Project description:** This project aims to investigate pseudotachylites—fault rocks resulting from the solidification of frictional melts formed along faults during fast seismic slip (slip rates of  $\sim 10^{-4}$ – $10^1$  m/s). Because the structures represent very rapid deformation, they can provide valuable clues about past fault movements and high-strain processes deep in the Earth's crust. Your goal is to investigate the relationship between fast seismic slip (pseudotachylite) and coexisting viscous (possibly non-steady-state) creep in the form of mylonites along the base of the Silvretta Nappe in eastern Switzerland. Through documenting the spatiotemporal distribution of the pseudotachylites as well as their timing and cross cutting relationships with the mylonite along the Silvretta Nappe you will infer strain localization processes during tectonic nappe emplacement and with that gain a better understanding of the seismic cycle.

**Project tasks:** You will perform field work at the base of the Silvretta Nappe using digital mapping tools and unmanned aerial vehicles (UAV; drones) to systematically 3D map the pseudotachylite occurrences, thicknesses, orientations and cross cutting relationships. You will collect sample material for detailed microstructural investigation. The latter will include a combination of light optical as well as scanning electron microscopy alongside several geochemical analyses (SEM EDS; LA-ICP-MS) to confirm if the material documents frictional melting. Finally, few samples from the pseudotachylites and their host rocks will be investigated for their potential of U-Pb dating of zircon or Ar-Ar of white mica and amphibole in order to constrain the timing of these seismic events during nappe emplacement.

