New time constrains on brittle faulting in the core of the Lepontine dome, central European Alps

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Near-surface deformation related to neotectonics is typically accommodated by brittle faults, where localized displacement can result in the development of fault gouge composed of rock fragments and authigenic clays. A recent study reported initial results from dating gouge formation in the central European Alps [2], with samples from surface outcrop and a hydro-electric tunnel in the Simplon region of the central Alps.

Our new data originate from the AlpTransit tunnel, which provides a perfectly exposed section through the Penninic nappes of northern Ticino, Switzerland, crosscutting the core of the Lepontine metamorphic dome. The K-Ar age for the < 2 micron illite fraction from fault samples range between 7.1 and 9.5 Ma. The ages decrease with grain size, with the < 0.1 micron fraction ranging between 3.9 and 7.2 Ma. The ages are consistent with published apatite fission track ages of around 6 Ma from the vicinity of the sampled section (for example [1]), consistent with illite stability in fault gouges requiring temperatures slightly higher than those of the partial annealing zone for apatite. Fine-grained clay separates from the fault gouges consist of illite 2M1 and M2 polytypes, smectite and chlorite, with minor amounts of K feldspar impurity. The measured K-Ar ages are quite constant throughout and do not correlate with amount of K feldspar impurity. This suggests that the very fine grained cataclastic feldspar grains have isotopically reequlibrated due to fluid-rock interaction within the fault zone.

[1] Wagner, G.A. Reimer, G.M. & Jäger, E. (1977) Cooling ages derived by apatite fission-track, mica Rb-Sr and K-Ar dating: the uplift and cooling history of the Central Alps. Mem. Ist. Geol. Mineral. Univ. Padova 30, 27p. [2] Zwingmann, H. & Mancktelow, N. (2004) Timing of Alpine fault gouges. *EPSL*, **223**, 415-425.

REE-Y-Sc-Nb mineralization in the Strzegom-Sobótka granitic massif, Fore Sudetic Block, Poland: composition and evolution

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The late Variscan Strzegom-Sobótka Massif (SSM) occurs in the Fore Sudetic Block. It consists of four types of granitic rocks. All of them represent individual intrusions with different sourcess [1]. Pin *et al*. [2] reported an age of ca. 330-325 Ma for the one of them and 290 Ma for other types of granites on the basis of Rb-Sr whole-rock dating.

The studied Strzeblów biotite granodiorite of SSM is strongly altered. The mineral assemblage consists of albite, K-feldspar, micas, quartz and kaolinite. Decomposition of of plagioclase, K-feldspar and biotite is related to strong albitization.

The rock contains acessory rare-element, REE,Y,Sc,Nb-rich mineralization. Monazite-(Ce), xenotime-(Y) and cheralite (~38 wt. % ThO_2, ~7 wt. % CaO) commonly form intergrowths with zircon. Hingganite-(Y) $Y_2Be_2Si_2O_8(OH)_2$, a member of gadolinite group, forms euhedral crystals with oscillatory zoning; it contains 30-36 wt. % Y_2O_3 and 15-23 wt. % of REE (La-Lu). Thortveitite ($Sc_2Si_2O_7$) forms subhedral crystals enriched in Y (≤16 wt. % Y_2O_3), Zr (≤5.7 wt. % ZrO_2) and Fe (≤4.4 wt. % FeO); a $Fe^{2+}Zr(Sc,Y,REE)_{-2}$ substitution is proposed. Sc,Ti-rich ixiolite is a principal Nb-Ta oxide phase; it contains ≤2.8 wt. % Sc_2O_3 and ≤8 wt. % TiO_2 but very low Ta (1-5 wt. % Ta_2O_5).

Textural and compositional features indicate magmatic origin of the rare-element minerals. However, post-magmatic to hydrothermal processes caused their partial alteration and recrystallization.

[1] Puziewicz (1990) *Arch. Min.* **XLV**, 1-2, 135-151. [2] Pin *et al*. (1989) *N. Jahrb. Miner. Abh.* **160**, 71-82.