



In-situ Rb-Sr dating of the SEMP mylonites, western Tauern Window, Eastern Alps

S. Schneider, K. Hammerschmidt & C. L. Rosenberg

Department of Geology and Geochemistry, Freie Universität Berlin, Germany

The SEMP (Salzach-Ennstal-Mariazell-Puchberg) Fault strikes along more than 300 km from the southern margin of the Vienna Basin to the northern Tauern Window (TW) accommodating a sinistral displacement of 60 km during the Tertiary (Linzer et al. 2002). New structural data (Rosenberg & Schneider 2005) show that the SEMP Fault continues into the TW within a 50 km long mylonitic belt of approximately 2 km width. This sinistral ductile shear zone, which marks the northern boundary of the Zentralgneis, strikes E to ENE, dips sub-vertically, and is characterized by gently W-dipping to subhorizontal stretching lineations (Schneider & Rosenberg 2005).

Structural and microstructural observations (Rosenberg & Schneider 2005) indicate that (1) the temperature of deformation progressively increased from N to S of the shear zone between approximately 300 °C and 500 °C, respectively. This gradient points to a S-side up displacement in addition to sinistral shearing; (2) the sinistral mylonitic foliation (S2) overprints the dominant alpine foliation of the western Zentralgneis (3) the sinistral mylonites are axial planar to the large-amplitude, upright folds of the TW.

Geochronological ages for the activity of the SEMP Fault do not exist yet. Previous work suggested that lateral extrusion started in the early Miocene (Kuhlemann et al. 2001 and references therein), deduced from the fast exhumation rates of the TW at this time. This interpretation, which however is biased by the idea, that the TW was exhumed by extensional unroofing during lateral escape of the Eastern Alps, indirectly constrains the onset of the SEMP activity to the early Miocene.

In the present study we determined the age of phengite (phg) grow due to mylonitisation of the SEMP. Using a micromill we cored cylindrical in-situ samples of phg, albite (ab) and calcite (cc) in the ng-range out of four thick sections. All sections

were prepared from granodioritic samples of the Zentralgneis, outcropping along a N-S section perpendicular to the strike of the mylonites of the SEMP, in the Stillupp Valley (Osttirol/Austria). Phg belongs to the S2-foliation, showing sinistral kinematic indicators like asymmetric pressure reaction rims of potassium feldspar (kfsp), anti-thetically sheared kfsp with internal reaction to phg along the shear plane and sinistral shear bands. The ab samples derive from the outer rims of albitised kfsp. Last the cc samples were taken out from euhedral cc in the pressure shadows of kfsp and from filled cracks within kfsp; all of these cracks are oriented perpendicular to the S2 foliation.

Microprobe analyses show that the composition of the phg is homogeneous without any chemical zoning in the content of the major elements. The average silicon content varies between 3.2 and 3.45 a.p.f.u. and the average aluminium content between 2.0 and 2.55 a.p.f.u.. The preliminary results of Rb and Sr isotope measurements can be plotted as two point isochrones, corresponding to an ab-phg age of 19.15 ± 0.03 Ma and a cc-phg age of 17.04 ± 0.3 Ma.

These results seem to show, independently from the structural evidence, that sinistral shearing along the SEMP Fault system occurred in the early Miocene, hence simultaneously with rapid exhumation in the TW. In addition, structural observations indicating contemporaneous folding and sinistral shearing, suggest that the ages above also date the formation of the large-scale, upright antiforms of the western TW.

REFERENCES:

- Kuhlemann J., Frisch W., Dunkl I. & Székely B. 2001. Quantifying tectonic versus erosive denudation by the sediment budget: the Miocene core complex of the Alps, *Tectonophysics*, **330**, 1 – 23.
- Linzer H. G., Decker K., Peresson H., Dell’Mour R. & Frisch W. 2002. Balancing lateral orogenic float of the Eastern Alps. *Tectonophysics*, **354**, 211 – 237.
- Rosenberg, C. L., Schneider, S., 2006, On the deep fate of the SEMP Fault along the TRANSALP seismic section (Eastern Alps). Abstract EGU06-A-08775, EGU General Assembly, Vienna, April 2006.
- Schneider S. & Rosenberg C. L. 2005. Kinematics of the SEMP Fault in the western Tauern Window (Stillupp Valley), *11.Symposium “ Tektonik, Struktur- und Kristallingeologie*, Göttingen, 201 – 202.