Only very limited low-temperature thermochronological data are available south of the Periadriatric Fault (PAF). Oligocene AHe ages were derived for samples from the inner portions of the External Dinarides (Fužine). Similar ages were found even in the southernmost Austroalpine units (e.g. the Reifnitz tonalite). Together, these ages are interpreted as belonging to a regional scale deformation event, which caused large-scale low-amplitude folding due to shortening mainly directed to the stiff interior of Adria. The PAF was also initially activated during this stage. Tonalites intruded into the eastern PAF during Early Oligocene (ca. 34 to 32 Ma; GENSER & LIU, 2010) forming a zone of weakness immediately activated as fault zone.

A major phase of dextral shear along the PAF is indicated by cooling ages of ca. 16 to 20 Ma, attributed to lateral extrusion of the Eastern Alps (e.g., RATSCHBACHER et al., 1991). A new Ar-Ar biotite age of 19 Ma from a mylonitic gneiss from the PAF near Kupitsch with a similar age corroborate this phase of exhumation and deformation.

We find latest Miocene/Pliocene AHe ages of ca. 7 – 5 Ma Ma for an Oligocene tonalite just north of the easternmost Periadriatic Fault. Similar ages were recently reported from the Lavanttal fault by WÖLFLER et al. (2010) and ascribed to fault activity and hydrothermal fluid circulation causing rejuvenation. Since our samples do not show any alteration fabrics we interpret them to indicate final uplift, which is supported by the young relief in this area: To the north, the Klagenfurt basin has been overridden by the Karawanken Mountains during Pliocene-Quaternary times. Formation of the Sava fold belt in the south is also of similar age. A denser network of low-temperature data is needed to refine these preliminary patterns and more results from ongoing apatite fission track and AHe work will be presented.

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Mapping the transition between the eo-Alpine HP-nappe system and the Ötztal-Bundschuh Nappe system using garnet zoning types and geothermobarometry

Heinisch, M.[1], Micheuz, P.[1], Krenn, K.[1], Hoinkes, G.[1] & Tropper, P.[2]

[1] Department of Mineralogy and Petrology, Institute of Earth Sciences, Karl-Franzens-University of Graz, Universitätsplatz 2, 8010 Graz, Austria
(manuel.heinisch@edu.uni-graz.at)
[2] Institute of Mineralogy and Petrography, University of Innsbruck, Innrain 52, 6020 Innsbruck, Austria

The investigated area is situated west of the Penninic Tauern Window directly at the already proposed transition between the Ötztal Nappe as part of the Ötztal-Bundschuh Nappe System and the Schneebergzug as part of the Koralpe-Wölz high pressure Nappe System. Aim of this study is to compare garnet major element zoning linked with pseudo-sections from different types of metapelites to be able to distinguish between polymetamorphic and monometamorphic units. Polymetamorphism means combinations of Variscan, Permian and eo-Alpine events which are related to the Ötztal Nappe (Variscan and Eo-Alpine) and the Texel Complex (Varsican, Permian and Eo-Alpine). Monometamorphism means eo-Alpine and is related to the Schneeberzug. Texel Komplex is together with the Schneebergzug part of the Koralpe-Wölz high pressure Nappe System.

Two main types of pre-Alpine garnet zoning patterns in the cores, type-1 and type-2 and two main types of eo-Alpine garnet zoning in the rims, type-3 and type-4 have been observed. Type-1 shows typical prograde zoning with decreasing XGrs (Grs30 to Grs8) and bell-shaped XSps patterns, as well as increasing XAlm (Alm60 to Alm70) and XPyp (Prp5 to Prp12) from the inner core close to the rim. Type-2 is characterized by homogeneous contents of XGrs (Grs8-10), XAlm (Alm70-75), XPyp(Prp10-15) from the inner core close to the rim. The rims of the porphyroblasts show two different garnet zoning types with significantly higher XGrs and can be distinguished into: type-3 with a small jump in XGrs (from Grs10 to Grs25), in XAlm (Alm75 to Alm60) and in XPrp (Prp15 to Prp10) and type-4 with a higher jump in XGrs (from Grs10 to Grs30), in XAlm (from Alm75 to Alm55) and in XPrp (from Prp15 to Prp5). Type-4 comprises a large garnet volume with a continuous decrease in XGrs (Grs30 to Grs20) and a continuous increase in XAlm (Alm55 to Alm65), and in XPrp (Prp5 to Prp10) towards the outermost rims.

To estimate the P-T conditions of pre-Alpine and eo-Alpine garnet growth, grossular-, almandine- and pyrope isopleths were calculated with the program Theriak Domino. The intersections of the isopleths yielded 0.7-0.9 GPa and 550-650°C for the pre-Alpine type-1 and type-2 garnets and also 0.8-0.9 GPa and temperatures from 550 up to 600°C for the eo-Alpine type-3 and type-4 garnets.

First approaches of this study support Variscan followed by an eo-Alpine metamorphic imprint and exclude a Permian HT/LP event.

Strain localization history of the Simplon Fault Zone: How far can we look back?

Herwegh, M.[1], Härtel, M.[1], Pettke, T.[1], Campani, M.[2] & Mancktelow, N.[2]

[1] Institute of Geological Sciences, University of Bern, Baltzerstrasse 1+3, 3012 Bern, Switzerland (herwegh@geo.unibe.ch)
[2] Department of Earth Sciences, ETHZ, Sonneggstr. 5, 8092 Zurich, Switzerland

Large-scale shear zones localize deformation, where with progressive exhumation old initial deformation fabrics are continuously overprinted under changing physico-chemical conditions. The study of such meso- to micro-scale structures provides the key for unraveling the retrograde geological evolution. When looking at these structures in the high strain parts, the question arises, up to which former stage these features still can be preserved, i.e. how far back in time can we look? To answer this question, we combine quantitative microstructural analyses in mylonitic quartz veins, with Ti in quartz geochemistry and thermochronological modeling on samples collected along vertical profiles across the Simplon Fault Zone(SFZ, SW-Switzerland).The SFZ is a major mid- to upper crustal shear zone accommodating substantial amounts of orogen parallel extension.

With increasing proximity to the fault plane (FP), dynamically recrystallized quartz grain sizes in the footwall decrease from a few mm (2-4 km away from FP) to sizes as small as 10-20 micrometers (a few meters away from FP). Along with this grain size reduction, dynamic recrystallization processes change from grain boundary migration, over subgrain rotation to bulging recrystallization. These variations indicate continuous strain localization, with decreasing temperature conditions and increasing flow stresses. Despite these trends, in close vicinity to the FP recrystallized grain sizes in different quartz veins show a considerable spread and all three recrystallization processes are found in different veins. When measuring Ti contents in these quartz veins, they are always high in the more distant parts but decrease the closer the sample is located to the FP. Similar to the quartz microstructures, the Ti concentration also shows a considerable spread near the FP, covering the entire range from highest to lowest Ti values. Ti in quartz geothermometry yields temperatures from 530°C down to 350°C. How is it possible that 'high-T' and 'low-T' microstructural and geochemical signatures can occur in samples just a few millimeters apart from each other, but all located in the most intensely deformed parts of the SFZ?

The answer to this question is synkinematic quartz veining combined with selective strain partitioning. All mylonitic quartz represents former, synkinematic quartz veins that formed