Ridge of Carpathian geology separating the Magura and the Pieniny (Meliata) oceanic basins. The above findings and interpretations have important impact on the Mesozoic paleogeography and subsequent tectonic evolution of the Eastern Alps.

Remnants of Moldanubian HP-HT granulites in the eastern part of the Bavarian Forest (south-western Bohemian Massif)

Teipel, U.[1], Finger, F.[2] & Rohrmüller, J.[1]

[1]Bavarian Environment Agency - Geological Survey, Leopoldstr. 30, D-95615 Marktredwitz.; [2] Salzburg University - Division of Mineralogy, Hellbrunnerstr. 54, A-5020 Salzburg; ulrich.teipel@lfu.bayern.de, johann.rohrmueller@lfu.bayern.de, friedrich.finger@sbg.ac.at

The Bavarian Forest in the SW Bohemian Massif is characterised by penetrative late-Variscan LP-HT regional metamorphism to anatexis and voluminous granite plutonism. Due to this late-Variscan tectonothermal reactivation between 330 and 315 Ma („Bavarian phase" of the Variscan orogeny sensu Finger et al. 2007), it is difficult to establish correlations between the Bavarian Forest and the major Moldanubian units further N and E (Gföhl unit, Variegated unit, Ostrong unit), which were not affected by the Bavarian tectonothermal phase.
Distinct felsic rocks in the eastern part of the Bavarian Forest that strongly resemble the ca. 340 Ma old Moldanubian HP-HT granulites of the Gföhl unit, provide an important clue for correlations. These rocks crop out in the Aubach valley near the Kropfmühl graphite deposit, NE of Passau. They consist mainly of quartz, K-feldspar (partly strongly perthitic) and plagioclase. Small pink garnet (up to 5 mm) is a minor (3-5 %) but ubiquitous constituent. It carries distinct inclusions (exsolutions) of tiny rutile needles that indicate a HP-HT history. In some samples relics of kyanite can be found, variably replaced by green spinel, sillimanite and muscovite. The late-Variscan LP-HT metamorphic overprint during the Bavarian phase caused resorption of the garnet coupled with the formation of plagioclase and spinel. Geochemical data indicate a felsic granitic protolith. Major and trace element contents show strong similarities to the typical leucogranitic granulites of the Gföhl unit (Janousek et al. 2004).
To examine the relationship with the granulites of the Gföhl unit, we have studied zircons by means of the electron microprobe, and dated individual growth zones using the SHRIMP method. Elongated to kidney-shaped zircon with rounded surfaces and tips, as well as compact, multi-faceted crystals are common. Most zircons show a typical zonation in the CL image with an inner, oscillatory zoned domain interpreted to represent zircon from the granitic protolith, and a high-CL rim zone, interpreted as metamorphic overgrowth. While the inner zone is characterised by significant P and Y contents (0.1-1 wt.%) and moderate to high U contents (200-1100 ppm U), indicating growth in a fractionated granite magma, the high-CL rim zone is always low in U, P and Y. Partial recrystallisation of the inner zone is indicated by local fading of the oscillatory zoning and the presence of transgressive or concordant recrystallisation patches in CL images. SHRIMP analyses in rim zones cluster around 340 Ma, and thus yield the well established age of granulite facies metamorphism in the Gföhl unit. Core analyses are variably affected by recrystallisation but, in general, point to an Ordovician or Silurian formation age of the granitic protolith.
All lines of evidence thus strongly suggest that the felsic granulites from Aubach are analogues to the Moldanubian HP-HT granulites as exposed e.g. in the Cesky Krumlov area.

Finger, F., Gerdes, A., Janoušek, V., René, M. & Riegler, G. (2007): Resolving the Variscan evolution of the Moldanubian sector of the Bohemian Massif: the significance of the Bavarian and the Moravo-Moldanubian tectonometamorphic phases. - J. Geosciences, **52**: 9-28.

Janoušek, V., Finger, F., Roberts, M.P., Frýda, J., Pin, C. & Dolejš, D. (2004): Deciphering petrogenesis of deeply buried granites: whole-rock geochemical constraints on the origin of largely undepleted felsic granulites from the Moldanubian Zone of the Bohemian Massif. - Trans. Royal. Soc. Edinb. Earth Sci., **95**: 141-159.

Monazite geochronology from the Permian contact aureole of the Brixen granodiorite

Thöny, W.F.[1], Wyhlidal, S.[1], Tropper, P.[1], Krenn, E.[2], Finger, F.[2] & Klötzli, U.[3]

[1]University of Innsbruck, Faculty of Geo- and Atmospheric Sciences, Institute of Mineralogy and Petrology, Innrain 52, 6020 Innsbruck, Austria; [2]University of Salzburg, Fachbereich für Materialforschung & Physik, Abteilung Mineralogie, Hellbrunnerstr. 34, 5020 Salzburg, Austria; [3]University of Vienna, Department of Lithospheric Sciences, Althanstr. 14, 1090 Wien, Austria; Werner.Thoeny@uibk.ac.at, Stefan.Wyhlidal@uibk.ac.at, Peter.Tropper@uibk.ac.at, erwin.krenn@sbg.ac.at, friedrich.finger@sbg.ac.at, urs.kloetzli@univie.ac.at

Within the Brixen granodiorite and the surrounding Southalpine quartzphyllite basement, monazite is ubiquitous and thus provides an excellent opportunity to obtain age data about the Permian contact metamorphic event. In the course of this study, samples were taken along a profile from the granodioritic intrusion into the contact metamorphic quartzphyllites from the adjacent Southalpine basement. Five samples, showing characteristic mineralogical and mineral chemical evidence for an increasing thermal overprint, were investigated. Additional to the monazite dating done at the Universities of Salzburg and Innsbruck, monazites and zircons from some of the samples were measured at the University of Vienna using the laser-ICP-MS.
Most of the monazites were dated using the electron microprobe. The limitations of this method lie in the whole rock chemistry and the uplift rate of the rocks. The lack of allanite for example may implicate a low Ca content of the whole rock and/or a rather fast post-Permian uplift rate of this area.
Two different generations of monazites were analysed with the electron microprobe in the hornfels samples from the contact aureole. An older generation of monazites shows average ages of 336.8 ± 16.8 Ma (48 data points) and low yttrium contents of about 1.0 wt.% Y_2O_3. These monazites seem to have formed contemporaneously with the Variscan garnets in the quartzphyllites. The second monazite generation shows consistently high contents of yttrium of about 2.6 wt.% Y_2O_3 and thus yield Permian ages of 267.5 ± 18.5 Ma (36 data points) corresponding to the age of the contact metamorphic event. The high yttrium contents can be related to the breakdown of garnet caused by the contact metamorphic overprint, which leads to a substantial modal increase of monazite/xenotime approaching the contact. The high Y-contents also indicate temperatures of 630-650°C, which agrees well with T data from the inner contact aureole. These monazite ages also correspond well with the U-Pb data obtained with the laser-ICP-MS on monazites, which yielded ages of 296 ± 31 and 331 ± 22 Ma.
The contact aureole of the Brixen granodiorite represents a petrologically well defined contact zone where four different zones regarding to the intensity of the thermal overprint can be distinguished. The fact that two generations of monazite occur throughout the entire contact aureole implies a wide temperature range of monazite stability from 500°C on.