PERMIAN GARNETS: INDICATION FOR A REGIONAL PERMIAN META-MORPHISM IN THE SOUTHERN PART OF THE AUSTROALPINE BASEMENT UNITS

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Permian magmatic rocks are common in the southern part of the Austroalpine basement units and along the Periadriatic Lineament. For example pegmatites occur in the Ortler-Campo-Unit (BOCKEMÜHL 1988), in the Wölz Complex (SCHARBERT unpublished data, JÄGER & METZ 1971) and in the Sau-Koralpe Complex, where also gabbros, the protoliths of the Alpine metamorphic eclogites (THÖNI & JAGOUTZ 1992) and the Wolfsberger granite (MORAUF 1980) are present. Now for the first time Permian garnets indicate a contemporary Permian metamorphic event in the polymetamorphic, metapelitic countryrock.

Sample material was collected in the Bretstein valley, close to the northern front of the Wölz Complex. They are garnet-micaschists with polyphase, idiomorphic garnet crystals up to 2 cm, occurring as an about 25 m thick concordant layer in micaschits and paragneisses with single phase Alpine garnets (SCHUSTER 1994). This special rock type was used because the Alpine overprint in this area reached only greenschist facies conditions and it is relatively easy to separate the up to 1cm large idiomorphic garnet cores from the rim.

Garnet separates Gr1 and Gr3 together with epidote inclusions of the core show an isochron age of 269 ± 3.5Ma. In spite of the used separation technique ruling out a contamination of the core seperate by the rim, and the fact that the sampled area experienced only a greenschist facies Alpine overprint, clearly below the closure temperature for the Sm–Nd system in garnet (HENSEN & ZHOU 1995), the measured ages can be interpreted as formation ages of the garnet cores. The age of the garnet rim was determined by analysis of a garnet concentrate, inclusions of epidote of the rim and a matrix powder. The result of 94 ± 15 Ma defines the age of the Alpine overprint.

A pegmatite, also from the Bretstein valley, was analysed to get more information about the time of the magmatic activity in this area. The primary magmatic minerals tourmaline and garnet together with the whole rock gave an age of 264 ± 38Ma. Individual calculations of the garnet with tourmaline and WR show ages of 262 ± 2 and 265 ± 2Ma respectively.

Estimation of the P/T conditions during the growth of the Permian garnet are difficult because only inclusions inside the garnet cores can be used. Monomineralic inclusions of margarite-, paragonite- and muscovite-rich micas allow a qualitative estimation of the Permian metamorphic event in the Wölz Complex with low pressure and greenschist facies conditions.

Rocks with similar garnet cores as the ones just discussed are frequent in the vicinity of Unzmarkt, the south-eastern part of the Wölz Complex. There, also lithologies with pseudomorphs after andalusite occur and Permian pegmatites are abundant.

In Permian time crustal thinning can be expected for parts of the Austroalpine basement units (FRANK et al. 1987). In such a tectonic regime the formation of the garnets, andalusite-bearing assemblages and magmatic rocks during high temperature metamorphism is one possible scenario. Considering the distribution of Permian magmatism huge, parts of the southern Austroalpine basement units might have been affected by this event (SCHUSTER & FRANK, in prep.)

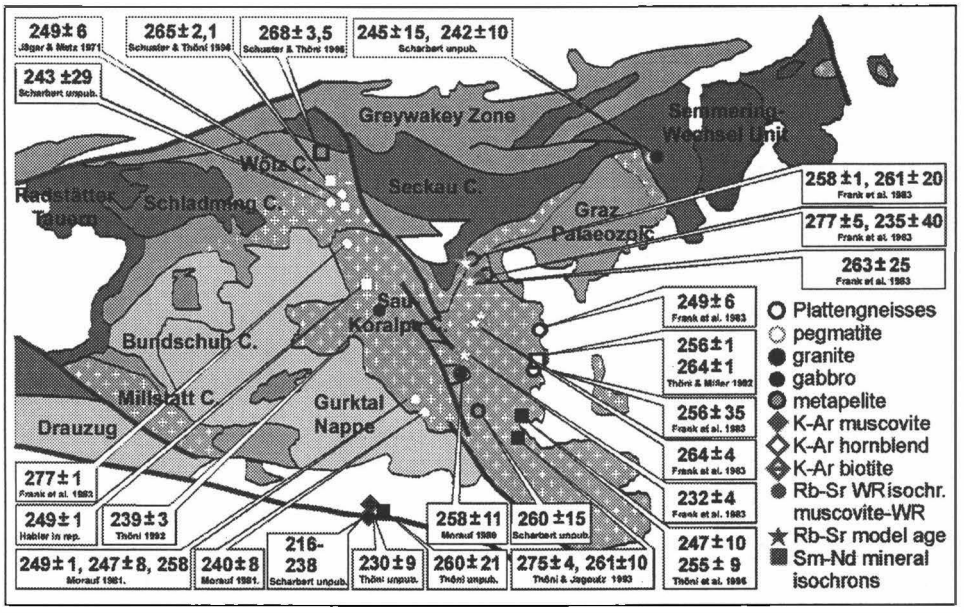

Fig. 1:
Distribution of Permian ages in the eastern Austroalpine basement units.

Until now for the Sau-Koralpe Complex no clear geochronological data older than 300 Ma are available. The concept for this area after FRANK et al. (1983) postulates a polyphase pre-Alpine (Hercynian) and Alpine history. This concept is based on the study of thin sections and analogies to andalusite bearing units in the Sopron area (frank, pers. comm.). Following DRAGANITS (1996), who favoures a post-Hercynian formation of the andalusite bearing rocks, the eo-Alpine age of the high pressure event (THÖNI, M. & JAGOUTZ, E., 1992) and the zonation of the Alpine amphibolite facies regional metamorphism (LICHEM et al., 1996), the concept of WEISSENBACH (1975) who argued for a three-stage contineous Alpine metamorphic history gets very actual.

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