Correlation of metamorphic P-T conditions between basement rocks in the Austro-Alpine units east from the Tauern Window and in the eastern sector of the Western Carpathians

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To compare Pre-Alpine metamorphic evolution, metabasites from the Middle Austro-Alpine units in the Eastern Alps (Mugel area, Seckauer Tauern, Rottenmann Tauern, Wölzer Tauern, Seetaler Alpen) and from basement complexes in eastern Slovakia (Branisko, Cierna Hora, Zemplinicum and Gemericum) were selected for petrological investigation. Some of these metabasites are lithologically correlated with leptinite-amphibolite complexes in Variscan units of the Western Europe and they partly associate with ultramafic rocks. Metamorphosed mafic rocks form Hochgrößen in the Rottenmann Tauern are represented by amphibolized eclogites and amphibolites. The peak pressure and temperature minerals in eclogite are omphacite with maximum jadeite content of 40 mol %, garnet and edenitic amphibole. Results of garnet-clinopyroxene thermometry indicated average temperature of 700 °C for eclogite facies metamorphism. Minimum pressure of 1.5 GPa is given by jadeite content in clinopyroxene. Equilibrium reactions of end-member amphibole, garnet and clinopyroxene gave pressures of about 1.8 GPa. Retrograde phases in the eclogites are symplectites of diopsidic clinopyroxene, pargasite and albite. P-T conditions for symplectite formation were estimated around 1.0 GPa and 500 °C. Metabasites from the Mugel area, Seckauer Tauern and Wölzer Tauern are amphibolites that besides amphibole and plagioclase may contain also garnet. Amphibole-garnet-plagioclase-quartz thermobarometry indicate 0.8 - 1.0 at 580-630 °C for these rocks. Metabasites from the Seetaler Alpen are characterized by the presence of garnet, amphibole and clinopyroxene-amphibole-albite symplectites. The clinopyroxene is rich in diopside with a maximum of 15 mol % jadeite content. Amphibole-garnet-plagioclase thermobarometry gave pressure of 1.0-1.5 GPa at 600-700 °C for these rocks.

Relatively low-pressure, but close to that from Seckauer and Wölzer Tauern are inferred for amphibolites in the eastern part of the Western Carpathians. Garnet-amphibole-plagioclase thermobaromtery, used for amphibolites from gneiss-amphibolite complex in the Gemericum, Branisko and for upper tectonic units in the Cierna Hora, indicated pressures of 0.6-1.0 GPa at 600 - 700 °C. Pressure of 0.6-8.5 GPa at 600-700 oC were obtained for amphibolites in the Zemplinicum. Metamorphic structures and mineral zonation indicate mostly a retrograde P-T path for all investigated metamorphic complexes in the Western Carpathians.

Alpine metamorphic assemblage were studied in granitoid rocks from the Grobogneis Complex (Lower Austroalpine unit) in the Eastern Alps and from Gemericum in the Western Carpathians. Metamorphic minerals in the Grobogneis Complex rocks are garnet, phengite, albite, biotite and amphibole. As newly formed minerals, the Gemericum granites contain phengite, albite, chlorite and rarely garnet. In both cases phengite has relatively high-Si content of 3.3 a./f.u. Metamorphic pressure inferred for Alpine overprint are 0.9 - 1.0 GPa at 450-500 °C in the Grobogneis complex and 0.5-0.7 GPa at 300-350 °C in the Gemericum.

The preliminary results from this investigation indicate similar tectonometamorphic evolution in the Eastern Alps and Western Carpathians during Variscan time. Although the age of the Hochgrößen eclogites is not known, the present position of these rocks indicate pre-Alpine high-pressure metamorphism. In this case subduction of the Plankogel oceanic basin and subsequent collision of the European plate should be responsible for this event. Some evidences of Variscan northvergent subduction in the Western Carpathians units can be found in the northern sector of the Gemericum. Comparing the Alpine metamorphic assemblages a continuation of medium- to high-pressure metamorphism can be assumed from the Grobogneis Complex through the Sopron massive in the Eastern Alps, Southern Veporicum to Gemericum in the Western Carpathians.