ARGUMENTS FOR A BASALTIC PROVENANCE AND A VARISCAN METAMORPHISM OF THE AMPHIBOLITIZED ECLOGITES IN THE AUSTROALPINE BASEMENT OF THE SCHOBERGRUPPE, EASTERN ALPS)

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Pressure-temperature-time (P-T-t) histories of eclogites in the Austroalpine basement of the Eastern Alps are the subject of recent research. Pre-Variscan, Variscan, as well as Eo-Alpine ages of the high-pressure stages have been advocated for the various occurrences. In the Austroalpine basement to the south of the Tauern Window, orthogneisses with Upper-Ordovician protolith ages are intercalated to metapsammopelites with Variscan (300 Ma) mica cooling ages. An increasing Alpine reworking of the northern basement parts is obvious from Variscan-Alpine »mixing ages« and from Eo-Alpine mica cooling ages (SCHULZ et al., 1993 and references therein). Sm–Nd isochrons from the Schobergruppe eclogites have been interpreted to date an Eo-Alpine high-pressure metamorphism in this basement (LINNER et al., 1996). This contrasts observations which point to a Variscan age of the eclogitic event and a subsequent amphibolite-facies overprinting (SCHULZ, 1993a). In the Prijakt area of the Schobergruppe (Eastern Tyrol), strongly foliated orthogneisses partly exceeding 10 m thickness, paragneisses and mica schists concordantly overlie, underlie and are intercalated with metabasites. Heterogeneous cm- to dm-scale banding is characteristic of the rare eclogites and abundant amphibole-eclogites, symplectitic garnet-amphibolites, garnet-amphibolites, amphibolites and zoisite-amphibolites. Planar and linear structures of the metabasites are parallel to the foliation and the lineation of the orthogneisses (former Upper-Ordovician granitoids), paragneisses and mica schists. These parallel structures were produced by a post-Upper-Ordovician deformation. As the linear fabric of the metabasites is defined by jadeitic clinopyroxene of the eclogitic stage and pargasitic amphiboles of the subsequent amphibolite-facies stage, this metamorphism is syndeformative and must be post-Upper-Ordovician. Geothermobarometry yielded 550–650°C/14–16 kbar for the eclogitic stage. Equivalent HP conditions and an amphibolite-facies overprinting have been obtained from a kyanite-staurolite-garnet mica schist below the metabasites (SCHULZ, 1993a). Garnets coexisted with albitic plagioclases in this sample. The garnet core-rim zonation trends show a marked decrease-increase-redecrease of Ca at increasing Mg. Similar characteristic variations of Ca and Mg in garnet have been observed in several metapelitic samples from the Austroalpine to the southwest (SCHULZ, 1993b), where exclusively Variscan mica cooling ages have been reported. These ages date the cooling after the amphibolite-facies stage of metamorphism. The similarity of the garnet zonation trends and P–T-path shapes in the Prijakt area with Eo-Alpine reworking, and in the other Austroalpine regions with Variscan cooling ages, provide an argument for a Variscan age of the eclogite and amphibolite-facies metamorphism. In the Schobergruppe, the postdeformative crystallization of muscovite in mica schists at temperatures below 500°C presumably can be related to an Eo-Alpine rejuvenation (SCHULZ, 1993a). Systematic correlations of major, trace and rare earth elements in the tholeiitic metabasites are attributed to fractional

crystallization processes only (SCHULZ, 1995). There is no systematic relationship between REE and modes of garnet, modes of epidote group minerals or the sum of these modes. A peculiar but regularly repeated four-stage »saw-tooth" like linear increase and decrease of REE, Hf, Ta, Th, Cs, Tb and Zr with decreasing mg-numbers is observed in Zr-REE coordinates. This may be explained by a discontinuous cyclic magmatic fractionation process. Chondrite normalized patterns are parallel and the degree of REE enrichment (15–50 times chondrite) is strictly correlated with the fractionation trend. A negative Eu anomaly, usually thought to reflect plagioclase fractionation during basaltic magma genesis, is preserved in all patterns. This provides an argument that the rocks crystallized from a basaltic liquid with plagioclase removed and do not represent former cumulates. In the Al_2O_3/TiO_2 screen for discriminating cumulates from liquids, all but the most primitive and evolved samples plot in the basalt liquid field. In addition, the TiO_2 contents (> 0.66 %) and the V contents (> 192 ppm) should exclude a gabbroic origin. Small grain sizes of the metabasites do not resemble former cumulates, even when a metamorphic recrystallization is considered. The LIL elements show an enrichment compared to N-MORB pattern. HREE follow the typical flat N-MORB pattern, but the LREE are slightly more enriched as the HREE. Ratios of (Ce/Yb)N are between 1.39 and 3.16, the ratio (La/Ce)N is < 1 for all samples. Both LIL and LRE elements enrichments reflect a »crustal component« during melt formation and the protoliths could be characterized as enriched N-MOR basalts. Metabasites with comparable geochemical characteristics and abundance in the pre-Alpine basement units of the Alps are seen in a context of lithospheric extension, as in continental rift zones. With (Tb/Ta)N from 0.93–3.31 and (Th/Ta)N between 1.38 and 2.50, the Prijakt metabasites show signs of back-arc basin basalts. Therefore the Prijakt amphibolitized eclogites represent a distinct suite among the other metabasites in the Austroalpine basement to the south of the Tauern Window (SCHULZ et al., 1993).

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