ECLOGITES AND COUNTRY ROCK ORTHOGNEISSES REPRESENTING UPPER PERMIAN GABBROS IN HERCYNIAN GRANITOIDS, RHODOPE, GREECE: GEOCHRONOLOGICAL CONSTRAINTS

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Granitoid rocks constitute a significant part of the Variscan orogen of Europe. Although ages of granitoids in W and C Europe have received significant attention, the time of formation of such rocks in its ESE part remains to a great extent unknown.

In the Rhodope (U)HP zone of N' Greece, orthogneisses are widespread in the different metamorphic thrust nappes involved in the Alpine collisional histories. Lenses and layers of amphibolitized eclogites occur in places within the orthogneisses. We analysed by SHRIMP II (ANU, Canberra) zircons from one eclogite lens and its country rock orthogneiss in E Rhodope (within the so-called lower tectonic unit), metamorphosed at ca. 14 - 16 kbar, 550 - 600 °C (MPOSKOS, 1989; LIATI & MPOSKOS, 1990). Cathodoluminescence (CL) imaging of the zircons reveals that, in both rock types, they consist mainly of a single oscillatory zoned (magmatic) part. Metamorphic rims are lacking, as zircon, generally, starts responding to recrystallization at (or above) T conditions of the upper amphibolite- or high-T (> 650 °C) eclogite-facies (e.g., LIATI & GEBAUER, 2003). A very thin, CL-bright rim was observed around the magmatic core of some orthogneiss zircon crystals, probably due to local fluid enrichment. Zircons of the eclogite yielded a ^{206}Pb / ^{238}U age at 255.8 ± 2.1 Ma, interpreted as the time of crystallization of the gabbroic protolith. Zircons of the orthogneiss yielded a protolith age of 313.9 ± 2.1 Ma. Similar ages were obtained for the upper tectonic unit of W Rhodope (294.3 ± 2.4 Ma for the orthogneiss protolith and 245.6 ± 3.9 Ma for the protolith of the adjacent eclogite (LIATI, submitted to CMP). Metamorphic ages were not possible to obtain, because of the very thin rims. One mixed analysis located on both rim and the neighbouring older core of an orthogneiss zircon indicates that metamorphism was Alpine.

The presence of Hercynian magmatism also in this area of Europe is confirmed by our data. The 255.8 ± 2.1 Ma age determined for the crystallization time of the gabbroic protolith of the enclosed eclogite suggests either rift-related underplating of mafic magmas at that time or the presence of a Late Permian ocean. The lack of other deep sea indicators favours rather the first view. Rift-related, Late Permian mafic rocks are known in the Alps (e.g. Ivrea zone) but they are not HP Presence of Late Permian mafic magmas within Hercynan granitoids, as found in the Rhodope is an uncommon situation for W and C Europe. If the Late Permian eclogite protoliths of Rhodope represent indeed rift-related underplated mafic magmas, they are amongst the youngest mafic intrusions in the Hercynian basement of Europe metamorphosed under Alpine eclogite-facies.

References

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