



Getermobarometry of the late Proterozoic to Paleozoic Barrovian metamorphic sequence in the Dacia megaunit: case study Eastern Serbia

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The Dacia megaunit in the Eastern part of Serbia comprises Getic and Supragetic nappe systems and corresponds to E-W striking Balkan Mountains (Sredna Gora and East Balkan units; sensu Schmid et al., 2020). The area of our study is located between Danube River to the East and Mlava to the West (Homoljske Mts., a part of Balkan Mts.) and consist of low to medium grade metamorphic rocks of Late Proterozoic to Early Paleozoic ages.

Two different metamorphic units were sampled:

(1) northern, low-grade metamorphic sequence is characterized by numerous types of chlorite sheets containing chlorite, epidote, muscovite, actinolite, hornblende and garnets together with quartz, albite and secondary calcite and fine-grained illite. Accessory minerals are titanite, rutile, ilmenite and apatite.

The sampled schists were recognized as belonging to low and lower part of medium grade Barrovian metamorphic assemblages, characterized by zonal distribution of the index-minerals: chlorite, epidote, biotite, amphibole and garnet.

(2) southern, medium-grade metamorphic sequence is characterized by different amphibolite rocks, with amphiboles (28-60 vol.%) ranging from tchermakite and magnesiohornblende to actinolite. Additionally, these rocks contain 17 – 40 vol.% of oligoclase, 5-22 vol% of quartz; 5 – 13 vol% chlorite (ripidolite), 0,4 – 13 vol% of Al-Fe epidote and 0,1-0,7 vol% of andradite garnet.

Multielement diagrams normalized to N-MORB of low-grade metamorphic sequence show enrichment of LILE relative to HFSE with negative Nb and positive K, U and Pb anomalies, while medium-grade metamorphic sequence shows a disturbed pattern with LILE >> HFSE, positive Pb anomaly and in some cases U, Th, while Nb, Ti and Sr are negative. Both sequences show significant crustal influence.

Medim-grade metamorphic sequence originate from an igneous precursor (andesite-subalkaline basalt protolith). Using Zr-Ti plot after Pearce, these rocks belong to volcanic arc basalts and within plate tholeiites. According to Meschede (1986) Zr/4-2Nb-Y and Wood (1980) Th-Hf/3-Ta plots, they

display normal to enriched MORB characteristics similar to basalts from volcanic arc setting.

Geothermobarometric calculations were made for garnet-amphibole-plagioclase assemblage from medium-grade metamorphic sequence using values of titanium in amphibole and aluminum in chlorites. Obtained temperature range between 600 and 750 °C while pressure range between 7 and 9 Kb, corresponding to the recognized amphibolite facies of medium grade metamorphism. A direction of increase of pressure and temperature conditions within the prograde metamorphic sequence towards the south is proposed.

References:

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