



## **Microstructural, geothermobarometric and geochronological constraints on the complex Alpine collisional history recorded on the low-grade „Psunj Complex“ metamorphic rocks of the Slavonian Mts. (Croatia)**

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Metamorphic rocks of the Slavonian Mts. (NE Croatia) cropping out on the SW edge of the Pannonian Basin belong to the Bihor nappe system of Tisia Mega-Unit i.e. of the lithospheric fragment broken off from the southern margin of the European plate. The present-day position of this Unit resulted from complex regional-scale Mesozoic and Cenozoic movements during the Alpine-Carpathian-Dinaridic orogenic system geodynamic evolution. Usually, the metamorphic rocks of the Slavonian Mts. are interpreted as a part of igneous-metamorphic complex belonging to metamorphic belt formed during or even prior to the Variscan orogeny. Until recently, the Alpine metamorphic evolution was considered insignificant and often neglected or described just in general terms due to considerable lack of geothermobarometric, phase equilibrium, fossil and/or geochronological age constraints.

The chlorite schists are widely distributed lithology in the area, comprising simple peak metamorphic mineral assemblage chlorite + plagioclase (albite) + muscovite + quartz  $\pm$  garnet and are associated to the local complex called Psunj complex (PsC). Metamorphic conditions for non-garnetiferous chlorite schists are obtained with chlorite (Al(IV)) thermometry and white mica barometry are 300 °C and 2.4 $\pm$ 0.6 kbar. The chlorite schists are thrust over ( $\sim$  to the NE) microtectonically similar chloritoid-bearing schists that reached peak P-T values of 3.5-4 kbar and 340-380 °C.

At least two distinct penetrative low-grade metamorphic foliations recorded in the chlorite schists are accompanied by existence of different populations of small ( $\sim$ 3.5  $\mu$ m) low-Th monazites, giving an average age 99 $\pm$ 15 Ma. Histogram of obtained ages shows two peaks at 120 and 80 Ma while age modelling recognized two peaks at 113 $\pm$ 20 and 82 $\pm$ 23 Ma.

First Alpine (113 $\pm$ 20 Ma) event represents a rare record of late Early Cretaceous thermal event that affected Bihor nappe system. The age contradicts common opinion that Bihor nappe escaped thermal changes during east-facing thrusting i.e. “Austrian orogeny”. The second (82 $\pm$ 23 Ma) monazite age population is tentatively associated with Late Cretaceous regional orogenic event characterized by low-grade low-pressure metamorphism. The post-tectonic growth of chloritoid (in chloritoid schist) with respect to S2 foliation indicates that the major phase of Alpine deformation predates the peak metamorphic conditions (thermal climax) leaving opened the possibility for detection of three distinct events during the Cretaceous.

Hence, the prograde Alpine metamorphic event(s) had a more significant influence on the evolution of the southern part of Tisia Mega-Unit than previously considered.