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Collision-related Early Paleozoic evolution of a crustal fragment from the northern Gondwana margin (Slavonian Mountains, Tisia Mega-Unit, Croatia): reconstruction of the P-T path, timing and paleotectonic implications

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Abstract

An orthogneiss from the oldest metamorphic complex at Mt. Papuk (Tisia Mega-Unit, Croatia) enables the quantification of the P-T evolution of Early Paleozoic rocks of the Panonian Basin basement in contrast to neighboring peri-Gondwanan terrains which are significantly overprinted by pre-Variscan, Variscan, and Alpine events. Two different groups of Ce-rich monazite within oval-shaped corona microstructures have been observed. Age dating of the corona cores yielded two populations with average ages of 528 ± 7 (2σ) Ma and 465 ± 7 Ma, respectively. Furthermore, an Y-rich group, found inside garnet cores, was dated at 616 ± 23 Ma. Th-rich monazite included in garnet rims yielded an age of 491 ± 6 Ma. The youngest monazite group at 417 ± 20 Ma is located inside mica. The orthogneiss precursor was a calc-alkaline to high-K calc-alkaline igneous peraluminous crustal rock (diorite) from an active continental marginal setting. The calculated P-T pseudosection in the MnNCKFMASHTO system in combination with assemblage characteristics and mineral chemistry data provide good constraints on the P-T evolution: for stage I peak P-T conditions of 13 kbar and 670 °C were derived followed by stage II, which was characterized by moderate cooling accompanied by uplift to mid-crustal levels (5.2 kbar and 610 °C).

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