



Prototethys, Paleotethys and Neotethys remnants in the Western Carpathians constrained by SIMS and LA-ICP-MS U-Pb zircon ages

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The south-vergent Variscan basement structure was recognized in the higher-grade complexes of the Cretaceous Tatric and Veporic units of the Inner Western Carpathians (Putiš, 1992). The Variscan Upper Unit gneisses, amphibolites, eclogites and serpentinites, with meso-Variscan granites, were thrust over the Variscan Middle Unit micaschists at ca. 356 Ma (40Ar-39Ar mylonitic amphibole ages; Dallmeyer et al., 1996). The SIMS and LA-ICP-MS determined Neoproterozoic zircon ages of mostly 700–550 Ma show Concordia ages at 572 ± 4 – 552 ± 5 Ma interpreted as Cadomian metamorphism of the micaschists and gneisses. The recycled zircons are Neoproterozoic to Archean, up to 3,400 Ma. Zircons of 2397 to 1091 Ma predominate in the Middle Unit monotonous micaschists. The Middle Cambrian to Late Ordovician meta-igneous members of the Upper Unit indicate an active Gondwana margin magmatic arc (Putiš et al., 2008). Igneous precursors of layered amphibolites, eclogites (478 ± 3 Ma) and orthogneisses were dated from 503 to 450 Ma. They are consistent with the Gondwana margin extension, the South-Armorican branch of the Rheic Ocean opening and the Armorican-Galatian terrane microplate temporary separation at ca. 440 Ma. This rock-suite shows the early Variscan metamorphic ages at ca. 410–380 Ma due to closure of short-lived Prototethyan South-Armorican Ocean (Faure et al., 2005), the magmatic arc northward subduction and the Armorican microplate docking the Gondwana. The Late Devonian BAB developed above this subduction zone. It is represented by the ophiolitic Pernek Group in the Tatric basement, where a N-MORB associated gabbro-dolerite dyke was dated at 371 ± 4 Ma (Putiš et al., 2009). The Gemic basement reveals the Paleotethyan riftogeneus complexes (Radvanec and Grecula, 2016; Németh et al., 2016). Calc-alkaline to alkaline volcanics of the volcano-sedimentary Gelnica and Rakovec Groups exhibit pre-ocean rift Cambrian to Ordovician (Vozárová et al., 2010) or Ordovician (Putiš et al., 2008) ages, respectively, recently confirmed by an Ordovician age of 471 ± 3 Ma determined in the Rakovec Group meta-trachy-rhyolite. The Devonian ages of gabbroic protoliths were found in the Klátov Group gneiss-amphibolite complex thrust southward over the Rakovec and Gelnica Groups. N-MORB-type meta-gabbros, dated from 410 to 380 Ma (Putiš et al., 2017) are associated with serpentinites, talc-carbonate schists, amphibole-plagioclase and less pelitic gneisses. This ocean rift zone of a peri-Gondwanan Paleotethyan basin formed contemporaneously with the South-Armorican Ocean closure. The closure of the Paleotethyan Devonian–Early Carboniferous basins was accompanied by the HP-MP/MT-LT metamorphism at ca. 360–350 Ma. At that time, the Paleotethyan complexes from the Gondwana side, as the Variscan Lower Unit (the Gemic basement), accreted northward to the Armorican microplate the latter represented by the early Variscan Tatric and Veporic (Prototethyan) basement complexes. The Neotethys ocean crust remnants (N-MORBs and E-MORBs associated with radiolarites) in the Meliatic unit (Putiš et al., 2011, 2014) underwent HP to MP metamorphism at 160–150 Ma (Dallmeyer et al., 1996). The mid-Triassic cherts are interlayered with pillows and both contain detrital zircon released from Permian to Early Triassic rifted sources.

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