



Late Devonian – Early Carboniferous polyphase metamorphic evolution of the Orlica-Śnieżnik Dome (NE Bohemian Massif, Poland): evidence from Th-U-total Pb monazite dating

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The Orlica-Śnieżnik Dome, located in the NE part of the Bohemian Massif, mainly consists of Cambro-Ordovician orthogneisses and the metavolcano-sedimentary Młynowiec and Stronie Formations. This study constrains electron microprobe Th-U-total Pb ages of monazite in (1) orthogneisses, (2) paragneisses of the Młynowiec Formation (MF), (3) mica schists of the Stronie Formation (SF) and (4) light quartzites. The latter light quartzites form a continuous 'horizon' between two metavolcano-sedimentary formations, however, they are traditionally treated as the lowest member of the Stronie Formation (SF). Our field and structural studies conducted along the transects crossing the boundaries between the above-mentioned rocks indicate that there is a stratigraphic and structural continuity between the Młynowiec and Stronie Formations. Samples for the monazite dating were collected at different distances from the contact between orthogneisses and metasediments. The aim of this study was to provide a new data to verify a hypothesis of Cambro-Ordovician contact or regional metamorphism of the Młynowiec-Stronie Group and to constrain age of the Variscan metamorphic events in the Orlica-Śnieżnik Dome.

Monazite from medium-grained orthogneiss yield dates ranging from 546 to 322 Ma, while three age domains of ca. 481 Ma, ca. 421 Ma and ca. 370 Ma are defined in fine-grained orthogneiss. Monazite in two porphyroblastic paragneisses (MF) yields two age domains of 369-361 Ma and 340-336 Ma. It should be noted that the older ages are recorded by inclusions of monazite in staurolite and plagioclase, as well as by matrix monazite. Monazite in leucosome of the migmatized paragneiss (MF) yields ca. 337 Ma age, while matrix monazite in melanosome yields ages of ca. 331 Ma age and a faint record of ca. 355 Ma. In two K-feldspar bearing light quartzites (SF), older spectrum of ages within 524-463 Ma, as well as younger ages of ca. 358 Ma and 347 Ma are obtained. On the other hand, only younger age domains of 371-356 Ma and 336-331 Ma are defined by monazite from four K-feldspar free light quartzites (SF), and two K-feldspar bearing light quartzite (SF). Similar two age domains of 372-363 Ma and 342-332 Ma yields monazite from six mica schists (SF), with a faint record of ca. 406 Ma in one of these samples.

The geochronological results suggest polyphase Devonian-Carboniferous metamorphic evolution that embraced at least two tectonometamorphic episodes. Microstructures indicate that the record of 370-360 Ma ages presumably defines a progressive metamorphism, whereas pervasive record of 340-330 Ma ages presumably reflects the superimposed penetrative shearing connected with exhumation. There is no evidence of pre-Variscan regional or contact metamorphism of the Młynowiec-Stronie Group. Cambrian to Ordovician monazites developed only in K-feldspar bearing rocks, i.e. orthogneisses and light quartzites (SF), which suggests growth of the Early Palaeozoic monazites during formation of their, respectively, magmatic and partially volcanic protoliths.

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