Shrimp zircon ages from gneisses help locate the West-East Sudetes boundary (NE Bohemian Massif, SW Poland)

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The precise delineation of tectonostratigraphic units (or terranes; Franke – Żelaźniewicz 2000) in the NE part of the Bohemian Massif is controversial, due to the mosaic structure and many rock ages uncertain. Interpretations are particularly speculative in the poorly exposed Fore-Sudetic Block in SW Poland, where the northern continuation of the Moldanubian Thrust (Suess 1912) and of its northern equivalent, the Ramzova/Nyznerov Thrust (Bederke 1929, Skácel 1989) is expected. The NNE-SSW trending thrusts separate (a) the Moldanubian Zone (MO) and the West Sudetes, from (b) the Moravo-Silesian Zone (MS), the latter including the East Sudetes in the north.

Schulmann – Gayer (2000) interpret the Moravo-Silesian zone to represent a NNE-SSW-trending belt being the result of the oblique Variscan collision between the Moldanubian terrane (and Lugicum = West Sudetes further north), and the pan-African Brunovistulian domain (microcontinent). During the collision, the western part of the Brunovistulian domain, composed of Neoproterozoic high-grade metamorphic rocks and granitoids, overlain by a Devonian-Carboniferous cover, was deformed, metamorphosed and piled up into a nappe sequence of the Moravo-Silesian zone.

The precise location of the West–East Sudetes boundary further north, in the Fore-Sudetic Block, has been variously interpreted: either along the Niemcza Shear Zone, or east of, west of or inside the Strzelin Massif (Bederke 1929, Oberc 1968, Skácel 1989, Cwojdziński – Żelaźniewicz 1995). Criteria to separate the West and East Sudetes include the gneiss protolith ages, with Neoproterozoic gneisses widespread in the MS Zone, and Cambrian/Ordovician orthogneisses typical of the West Sudetes (e.g. Finger et al. 2000, Kröner et al. 2000, Turniak et al. 2000).

The Strzelin Massif comprises four gneiss types (Oberc-Dziedzic 1999): (1) the fine- to medium-grained, porphyritic Strzelin gneiss; (2) the Gościęcice augen gneiss; (3) the migmatitic Nowolesie gneiss; (4) the Stachów gneiss (dark fine-grained, and light coarse-grained varieties).

SHRIMP zircon ages of 600–568 Ma for the Strzelin gneiss (Oberc-Dziedzic et al. 2001) confirmed earlier interpretations of this gneiss as an equivalent of the Keprnik gneiss (584 ± 8 Ma, Kröner et al. 2000) from the Moravo-Silesian zone and, therefore, its affinity with the East Sudetes. However, the Gościęcice augen gneiss, yields a Cambrian/Ordovician age (504 ± 3 Ma, Oliver et al. 1993), similar to the Śnieżnik gneisses in the West Sudetes (Oliver et al. 1993, Turniak et al. 2000). The Gościęcice gneiss overthrusts the Strzelin gneiss along a few meters thick shear zone termed the Strzelin Thrust.

New SHRIMP zircon data on the light Stachów gneiss (W part of Strzelin Massif) shows: (a) inherited zircon cores of Palaeo- to Neoproterozoic ^{206}Pb–^{238}U ages (from 1916 ± 25 to 636.3 ± 8.4–560.3 ± 6.9 Ma), and (b) mostly euhedral and zoned crystals, Cambrian/Ordovician in age, with a mean of 500 ± 5 Ma interpreted as the age of emplacement of the magmatic precursor of the gneiss. The ages of inherited zircon cores from the Stachów gneiss suggest that source materials for the Stachów gneiss and the Strzelin gneiss (with inherited zircon cores of 1230–1870 Ma) were different. The contact of the Early Palaeozoic Stachów gneiss with the Nowolesie gneiss (petrographically equivalent to the Proterozoic Strzelin gneiss) is also a several tens of meters thick mylonite zone representing another part of the Strzelin Thrust. Consequently, the Strzelin Thrust, separating gneisses of Neoproterozoic and Early Palaeozoic protolith ages, can be considered as the northern continuation of the West and East Sudetes boundary within the Fore-Sudetic Block.

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