# SHRIMP Zircon Geochronology of the Neoproterozoic Strzelin Gneiss: Evidence for the Moravo-Silesian Zone Affinity of the Strzelin Massif, Fore-Sudetic Block, SW Poland

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Along the eastern margin of the Bohemian Massif, the West Sudetes (Lugicum, LU), together with the Moldanubian Zone (MO) to the south, are in contact with a NNE-SSW trending belt, referred to as the Moravo-Silesian (MS) Zone (Suess 1926; Kossmat 1927). This major tectonic boundary was already recognized in the early 20th century by Suess (1912) and considered a large scale overthrust zone (Moldanubian thrust). Recently, Schulmann and Gayer (2000) interpreted the MS Zone as a continental accretionary wedge developed by oblique collission between the MO/LU terrane and the pan-African Brunnovistulian microcontinent during the Variscan orogeny.

The contact between the MO/LU domains and the MS Zone is well-defined in Moravia and in the mountainous region of the Sudetes, where it follows the Moldanubian thrust and its northern continuation - the Ramzova (and/or Nyznerov) thrust. The latter boundary separates the West Sudetes from the East Sudetes (= N part of the Moravo-Silesicum). Further north, beyond the Sudetic Marginal Fault, i.e., in the poorly exposed area of the Fore-Sudetic Block (FSB), the location of this major tectonic boundary becomes obscure and debatable. It was located either along the E edge of the Niemcza Zone, or east, west, or inside the Strzelin Massif (Bederke 1929; Oberc 1968; Skacel 1989; Oberc-Dziedzic 1999). Among the criteria used to distinguish between units of MO/LU and MS (Brunian) affinities and, consequently, to locate the West-East Sudetes boundary, are lithostratigraphic differences, specific types of protoliths and their ages, and different P-T-t paths. The West Sudetes domain is characterized, among others, by the wide distribution of orthogneisses, with granitic protolith ages of c. 500 Ma (conventional U-Pb multigrain zircon dating by Oliver et al. 1993). Such gneisses are found, e.g., in the Izera-Karkonosze Massif, Orlica-Śnieżnik Dome and, locally, in the FSB (Wądroże Wielkie). In contrast, the East Sudetes domain contains abundant orthogneisses of Neoproterozoic ages (e.g., Keprnik gneiss of 546 ± 6 Ma, Velké Vrbno gneiss of c. 574 Ma, and Desná gneiss – between 570 and 650 Ma; Schulmann and Gayer 2000, and references therein).

In the Strzelin Massif, four main types of gneisses of various textures and compositions were distinguished (Oberc–Dziedzic 1999): (1) fine- to medium-grained, porphyritic biotite-muscovite gneisses and granitogneisses = the Strzelin gneisses (*sensu stricto)*; (2) the Gościęcice augen gneisses; (3) the Nowolesie migmatitic, sillimanite gneisses; (4) the Stachów gneisses, represented by two varieties: dark, fine-grained migmatitic gneisses and light, coarse-grained gneisses. Two of these types are widespread: the Strzelin gneisses in the northern part of the massif, and the Nowolesie gneisses in its southern part.

The SHRIMP zircon geochronological study on the Strzelin gneiss indicates the presence of: (a) inherited zircon cores of Palaeo- to Mesoproterozoic $^{206}Pb-^{238}U$ ages (between 1230 ± ± 8 Ma and 1879 ± 29 Ma), and (b) mostly euhedral and zoned crystals, Neoproterozoic in age; the latter define two distinct means of 600 ± 8 Ma (group A) and 568 ± 6 Ma (group B). The wide age distribution of the cores, within a time span of c. 650 Ma in the Proterozoic, suggests that different Precambrian crustal elements were the source material for the protoliths of the gneiss. The likely scenario envisages the erosion of various granitic protoliths, sedimentation (after 1230 Ma ago), and partial resistance of the original components to subsequent metamorphic dissolution and/or anatectic resorption (in Neoproterozoic times). The euhedral zircons of both the groups A and B are indistinguishable in the cathodoluminescence images. In spite of that, the obtained distinct age contrast means, most probably, two different thermal events inducing zircon recrystallization, namely at c. 600 Ma and 568 Ma ago. At least the first of these two Neoproterozoic events, whatever in anatectic or metamorphic conditions, must have been preceded by the partial resorption of the older zircon grains, already present in the precursor of the gneiss. The Variscan deformation and metamorphism obliterated original features of the Neoproterozoic precursors of the gneiss but the zircons did not document these events.

In general, the new results confirm earlier assumptions of Proterozoic age of the Strzelin gneiss protoliths, and indicate their similarity to orthogneisses in the East Sudetes tectonic domain (e.g. Velké Vrbno and Desná gneisses). The Neoproterozoic dates are surprisingly different from the age of 504 ± 3 Ma obtained by Oliver et al. (1993) for the Gościęcice gneiss from a neighbouring locality (and by them misleadingly referred to as the Strzelin gneiss). Although the new data do not provide unequivocal arguments, they strongly support, together with the presence of characteristic coarse- to fine-clastic Devonian(?) metasediments in the area, the pan-African Moravo-Silesian (Brunian), and not West-Sudetic (Lugian) affinity of the Strzelin Massif.

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# Evidence of Volcanism in the Middle Triassic Reifling Limestones of the Hronikum Unit

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## Introduction

Tuffaceous material present in Middle Triassic limestones is generally known. Volcanoclastic intercalations occurr in basinal facies represented mainly by Reifling limestones. In Middle Triassic successions in Alps these volcanoclastic horizons are more common and known under the name “Pierta verde”. In Western Carpathians similar rocks occur in Turnaicum and Silicikum. First occurrence in Hronikum is known from hte Polish part of Západné Tatry mountains (Kozsowska at al. 1998). The present paper describes the first occurrence in Hronikum in Slovak territory.

## Geological setting

Locality is situated in the Chočské vrchy mountains on western slope of Veľký Choč, ca 1.5 km NE from Valaská Dubová village. In the surroundings, two tectonic units are present: upper part of the Krížna nappe (Neocomian and Poruba Member) and lowermost slice of the Choč nappe (Gutenstein limestones and dolomites, Ramsau dolomites, Reifling limestones).

Tuffaceous material forms intercalations in Reifling limestones, varying in thickness between 1 and 20 cm. Original volcanic material is strongly argillitized and calcitized, with phantomatic structures of vitroclastic and blastofelsitic fragments.



**Fig. 1.** Distribution of Midlle Triasic tuffaceous intercalations in pelagic limestones of the West Carpathians.



**Fig. 2.** Map of the study areas.