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**TIMING OF PRE-VARISCAN MAGMATISM IN THE KŁODZKO  
METAMORPHIC COMPLEX (CENTRAL SUDETES, POLAND):  
FIRST INSIGHTS FROM CONVENTIONAL U/Pb ZIRCON DATING**

The Kłodzko Metamorphic Complex (KMC) crops out in the Central Sudetes between the Góry Sowie Massif and the Orlica-Śnieżnik Dome. It comprises metasedimentary and variable, mostly basic, metaigneous rocks and granitoids metamorphosed under greenschist to amphibolite facies conditions (Wojciechowska 1966, 1990; Kryza, Mazur 2001). These crystalline rocks form a NW-SE elongated outcrop zone (ca 100 km<sup>2</sup>) bounded in the south and west by Upper Carboniferous to Lower Permian clastic sedimentary sequence of the Intra-Sudetic Basin. In the NE, the KMC is unconformably overlain by the unmetamorphosed Upper Devonian conglomerate and limestone forming the basal part of the Bardo succession (Haydukiewicz 1990). The SE boundary of the KMC is defined by an intrusive contact with the Kłodzko-Złoty Stok granitoid of unknown, probably Early Carboniferous age.

The KMC was previously considered a continuous volcano-sedimentary succession with a thickness of 1500-2000 m (Wojciechowska 1966, 1990; Narebski et al. 1988). Its age was interpreted as Silurian – Early Devonian, basing on a single stratigraphic record from the crystalline limestone intercalated in the lower part of the KMC. This fossil-bearing rock contains fauna which was originally assigned to Upper Silurian (Gunia, Wojciechowska 1971) but subsequently re-interpreted as Middle Devonian (Hladil et al. 1999). The upper time limit for the development of the KMC is provided by the presence of the Upper Devonian strata resting upon the eroded metamorphic series. In a new interpretation of Mazur and Kryza (1999), the KMC comprises a number of separate tectonic units. Consequently, the existing stratigraphic record does not constrain the evolution of the whole KMC succession but only refers to its lowermost section. Since the stack of tectonic units might be stratigraphically inverted, new age data for the KMC turn out to be of particular importance.

The KMC comprises six tectonic units representing from base to top: (1) the Mały Bożków Unit comprising Middle Devonian (Givetian) progradational shelf sequence (Hladil *et al.* 1999), (2) a mélangé body defining the Łączna Unit (Mazur, Kryza 1999), (3) Bierkowice Unit composed of mafic volcanics with intraplate

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basalt geochemical signature (Kryza *et al.* 2000), (4) MORB-type gabbro of the Ścinawka Unit (Kryza *et al.* 2000), (5) gabbro and MORB-type mafic volcanics of the Orla-Gołogłowy Unit (Kryza *et al.* 2000), intruded by granitoids and their subvolcanic equivalents and accompanied by deep marine sediments, (6) distal flysch with basaltic lavas, associated with pyroclastic sandstones and dacitic/andesitic tuffs, composing the Kłodzko-Twierdza Unit. The tectonic contacts between the units were mostly inferred from their contrasting metamorphic paths (Kryza, Mazur 2001) and affinities to different tectonic settings.

Four representative samples were collected for geochronological study from the two uppermost tectonic units of the KMC. Three of them (SCI, GPL and K-163) come from the Orla-Gołogłowy Unit whereas one (TKT) from the Kłodzko-Twierdza unit. Samples SCI and K-163 represent Ścinawka metagranite intruded into amphibolites whereas GPL belong to the plagioclase gneiss closely associated with metagabbros. Sample TKT corresponds to a rhyodacite/andesite tuff forming a regular layer within the volcano-sedimentary succession. Zircon measurements based on the conventional multigrain U/Pb method were carried out at the *Zentrallaboratorium für Geochronologie Universität Münster*.

Sample GPL yielded abundant high quality zircons. Their crystals are euhedral, transparent, colourless to light yellow, prismatic with magmatic oscillatory zoning. A small proportion of cloudy or inclusion-bearing zircons were avoided during grain selection. Four analysed zircon fractions from GPL give discordant results (Fig. 1a). The regression of data reveals the upper intercept age of  $590.2 \pm 9.7$  Ma which is interpreted as the time of igneous crystallization of the protholith for the plagioclase gneiss. Six grain-size fractions of zircon from SCI yield discordant ages (Fig. 1b). The upper intercept age of  $501.0 \pm 5.5$  Ma probably reflects crystallization age of the granitic protholith for the Ścinawka gneiss. A similar age of  $499.6 \pm 4.8$  Ma was obtained for zircons from K163, based on a 10-point isochron (Fig. 1c).

The TKT sample contains mixture of genetically different zircon grains. Eight grain-size fractions were carefully classified according to color and morphology. The youngest  $^{207}\text{Pb}/^{206}\text{Pb}$  ages clustering at ca. 600 Ma could reflect minimum depositional age of tuffaceous component of the rock. From the position of data points on the Concordia diagram it is likely that detritic zircons are derived from a source older than 2Ga.

Our preliminary results indicate occurrences of Proterozoic crust in the structurally higher parts of the KMC. The new data are in accord with a model that suggests a nappe structure for the KMC with the Middle Palaeozoic succession at the base and the Early Palaeozoic/Upper Proterozoic units at the top. Consequently, the KMC seems to represent a composite tectonic suture which juxtaposes elements of pre-Variscan basement against the Middle Palaeozoic passive margin succession. The latter is most likely related to the marine basin parental for the Sudetic ophiolites. The ages of detritic zircons from TKT suggest Armorican affinities of the Proterozoic crust involved in the suture.

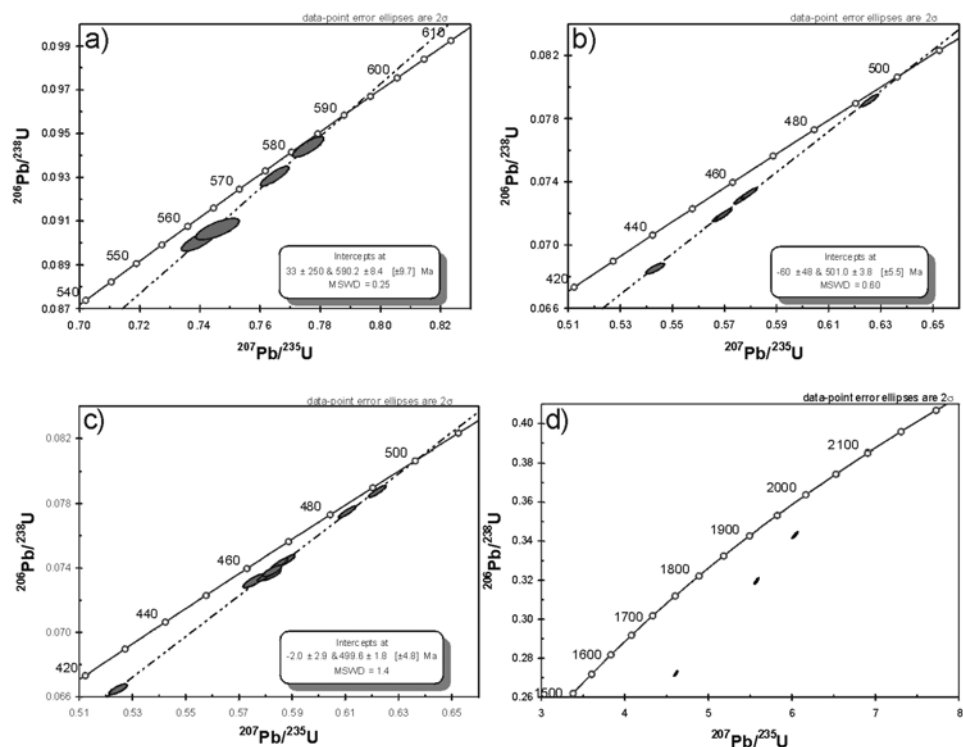


Fig. 1. Concordia diagrams showing U-Pb data for (a) GPL, (b) SCI and (c) K163 samples from the Orla-Gologłowy Unit. Diagram (d) shows preliminary results for oldest zircon fractions from TKT sample (the Kłodzko-Twierdza Unit).

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