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Alfred MAJEROWICZ[1]

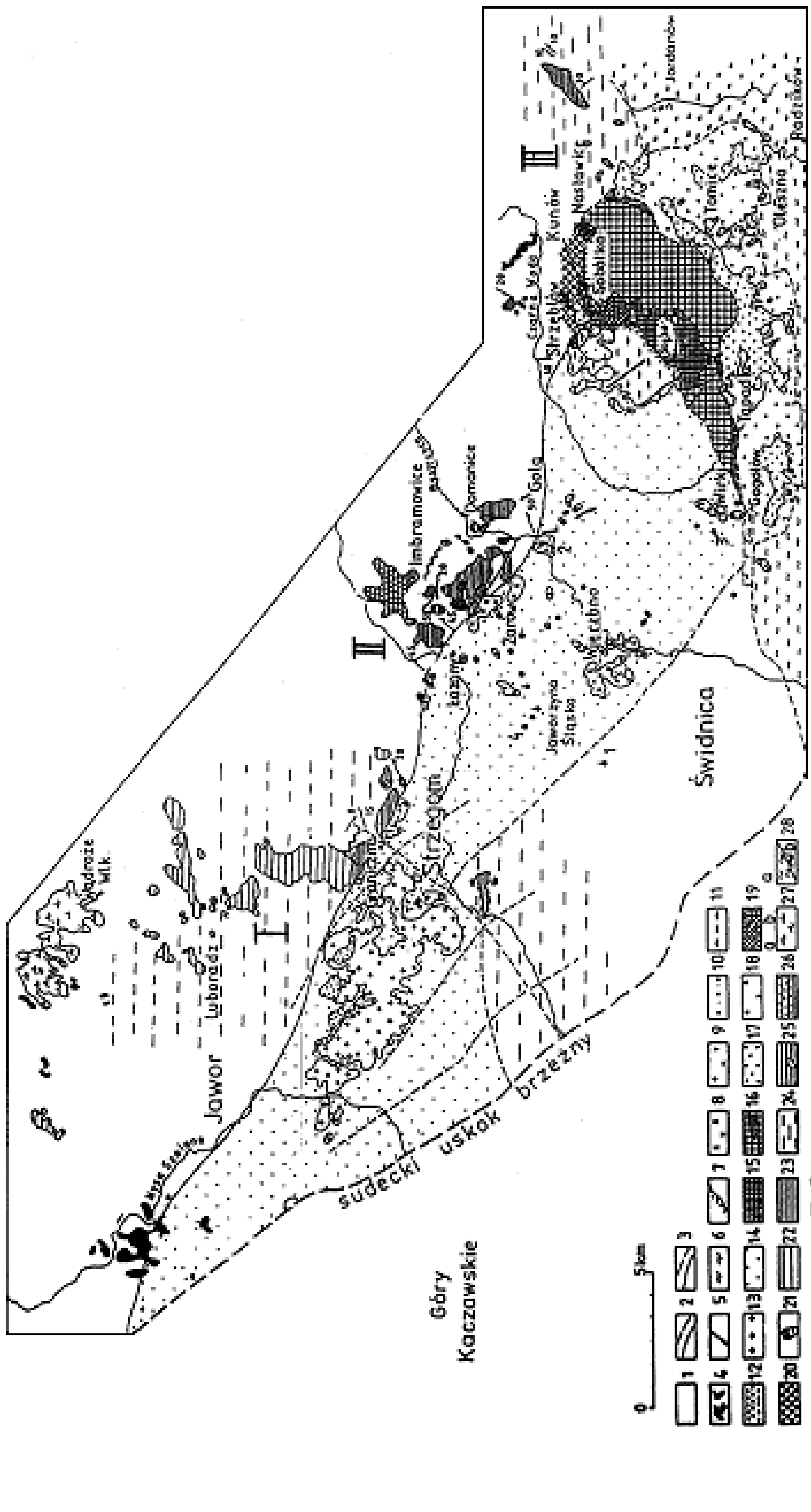
SELECTED PETROGRAPHIC PROBLEMS OF THE NE COVER OF THE STRZEGOM-SOBÓTKA GRANITOID MASSIF

Based on detailed petrographic studies of Majerowicz (1966, 1995), and considering the type of metamorphism and metamorphic grade, the whole metamorphic cover of the Strzegom-Sobótka granitoid massif (Fig. 1) can be subdivided into three zones: 1) the SE zone characterized by a low-grade regional metamorphism (III), 2) the central zone with bimetamorphism, where the regional transformations are overprinted by the contact metamorphism (II), and 3) the NW zone with a low-grade regional metamorphism (I). The metamorphic series of the whole area are intensely tectonized and form lying folds and thrusts of a south-eastern vergency (Oberc, 1972) or northern vergency (Kural, 1991, Mierzejewski, 1995, Maciejewski, 1975).

In the SE zone, in the vicinity of Pustków Wilczkowicki, there are siliceous schists (metalidites) with radiolaria remnants (Spumellina suborder), phyllites (partly siliceous) with a graphitoid as well as metamudstones and metagraywackes. The DTA study of the graphitoid (Kwiecińska and Parachoniak, 1976) shown that the regional metamorphism of these rocks slightly exceeded (progressively) the conditions of the greenschist facies. Siliceous schists, graywacky-quartzitic-sericite schists with greenschist intercalations, together with phyllites with dolomite intercalations, as well as greenschists and epidiabases occur in the NW zone (Majerowicz, Mierzejewski).

The granitoid intrusion is generally considered as post-tectonic, but it has developed in several stages and phases (Majerowicz, 1972). The intrusion margins are locally conformable with the country rocks, and in other places discordantly cut the metamorphic cover at various depths. Fragments of the country rocks, torn apart and displaced, are particularly well seen in drill-cores (Maciejewski, 1975). According to the present author the granitoids can be petrographically subdivided into biotite granodiorites, biotite- or hornblende-biotite monzogranites, two-mica leukogranites and alaskitic metagranites. Tonalites from Łazany and leukomonzogranites from Zimnik represent other rock types, related to distinctive magmatic phases. Gradations between biotite and two-mica granitoids can be observed. The contact of the latter with the rock of the Ślęża ophiolite where described in detail by the present author. Different opinions were later expressed by Puziewicz (1998) based on the Sr isotopic variation, but the differences are obvious considering so strong protolith variation.

[1] *University of Wrocław, Institute of Geological Sciences, Department of Mineralogy and Petrology, ul. Cybulskiego 30, 50-205 Wrocław, Poland, phone 0(prefix)71 3759202*


Góry Kaczawskie
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sudecki uskok brzeżny
Imbramowice
Gola
Kunów
Jaworzyna Śląska
Oleszna
Tomice

Fig. 1.Geological sketch map of the Strzegom-Sobótka massif (*see neighbouring page*). 1 – Cenozoic; 2 – faults; 3 – lithological boundaries; 4 – Tertiary basalts; 5 – quartz veins; 6 – alaskite metagranite; 7 - two-mica leucogranite of contact zone; 8 – two-mica lucogranite; 9 – Hbl-Bt monzogranite; 10 – Bt granodiorite grading into monzogranite; 11 – Bt granodiorite; 12 – Zimnik fine-grained leucogranite; 13 – Łazany tonalite; 14 – undivided granitoids covered; 15 – Ślęża metagabbro; 16 – same, covered; 17 – serpentinities; 18 – same, covered; 19a – amphibolities, b – amphibolities of Ślęża ophiolite; 20 – same, covered; 21 – ultramafic rock and metagabbro at Imbramowice; 22 – variegated schists; 23 – hornfels-like schists; 24 – same as 22 and 23, covered; 25 – intercalations of calc-silicate rocks; 26 – greenstones; 27 – gneisses of Góry Sowie and Wądroże Wielkie; 28 – same, covered; 29 – lineation (strike-dip); 30 – bore holes; 31 – bore holes with metabasites; 32 - zones of regional metamorphism and bimetamorphism after Majerowicz: 33 – borders of metamorphic facies (isogrades).

Rocks chemically similar to phyllites, showing a mineralogical and structural variation representative of the contact zone, are found in the vicinity of Graniczna (the western part of zone II). Considering the granitic intrusion thickness “D” of ca. 10 km (following the assumptions of Jaeger and Winkler, 1974) and the intrusion depth of ca. 5-6 km (Majerowicz, 1972, Janeczek, 1985) it can be assumed that the temperatures at the contact zone were of ca. 610-620ºC, and at the distance of 1/10 “D” of ca. 520-540ºC. Typical nodular schists with the andalusite + cordierite + biotite + muscovite + quartz paragenesis, indicative of the hornblende-hornfels facies, developed closer to the contact. Spotty schists with the biotite + muscovite + chlorite paragenesis, with initial andalusite and indistinct cordierite blastesis, developed ca. 1 km (1/10 “D”) of the contact (Bartoszówek, north of Graniczna) and represent a gradation to the albite-epidote-hornfles facies, with the temperature slightly above 500ºC. Phyllites without any evidence of contact metamorphism occur further north.

Small intercalations of calc-silicate rocks in the middle part of zone II (Krukowska Góra, Jaroszów, Siedlimowice) show a variable composition (Fig. 2), resulting in the diopside + tremolite + calcite + quartz paragenesis or, in the case of more marly protoliths, the zoisite + epidote + grossularite + quartz + basic plagioclase + calcite paragenesis. Sillimanite that occurs in some near-contact rocks could have originated due to a decomposition of micas (Gołaszyce, Łazany, Rogów Sobócki). Considering also the almandine garnet found in these localities the paragenesis of cordierite (pinitized) + almandine + sillimanite + biotite + muscovite + acidic plagioclase + quartz, formed at a higher temperature range of the hornblende-hornfels facies, can be assumed.

The amphibole rocks that occur at the base of schistose hornfelses at Domanice show a facially disequilibrated paragenesis: actinolite hornblende + actinolite + chlorite + plagioclase of variable compoasition, which may indicate temperatures slightly exceeding 500ºC. These amphibole rocks possibly occur at a similar distance to the contact zone as the schists from Graniczna. Temperatures close to the solidus of a granodioritic magma were attained in large rafts of country rocks within granodiorites at Gołaszyce. The rafts underwent a partial migmatisation, and the cotectic relationships of K-feldspar – quartz – acidic plagioclase in a ptygmatically folded vein point to the temperature of ca. 670ºC, assuming H_2O pressure of ca. 2 kb.

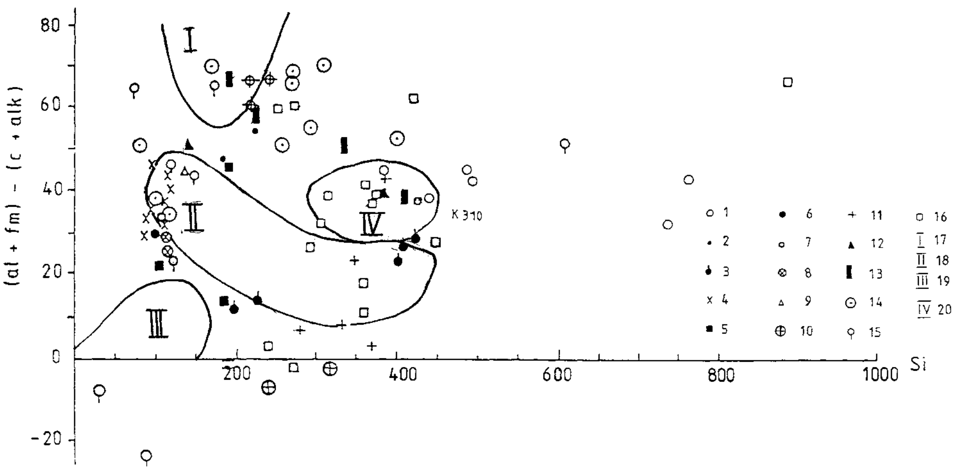

Fig.2 Simonen diagram with chemical analysis of country rocks of the Strzegom- Sobótka massif. 1 – Rogów Sobócki: mica schists; 2 – Pustków Wilczkowicki, Nasławice: phyllite, siliceous schists; 3 – Garncarsko: mica schists, amphibole schists; 4 – Imbramowice: greenschists; 5 – Siedlimowice: amphibole rocks; 6 – Jaroszów: calc-silicate schists; 7 – Tarnawa: amphibolite; 8 – Krakowska Góra: calc-silicate schists; 9 – Siedlimowice: calc-silicate rocks; 10 – Łazany: hornfelses, schists; 11 – Pożarzysko: mica schists; 12 and 13 – Pustków Wilczkowicki: siliceous graphite schists and metagraywackes; 14 and 15 – Damiany, Konarów, Jenków: micaceous schists; 16 – Krakowska Góra, Siedlimowice: calc-silicate rocks; 17 to 20 – fields of the Moldanubian rocks given here as examples, (Simonen, see Suk 1983).

The map (Fig. 1) shows approximate position of isograd zones of andalusite appearance in the vicinities of Graniczna, Goczałków and Rogów Sobócki, and of hornblende and andalusite appearance in amphibole rocks with calcite south of the Imbramowice greenschists. The strong tectonics of the area mentioned above, discussed by Majerowicz and Mierzejewski (1995), together with selected drill core logs prepared by Maciejewski (1975), which point to an alternation of rock types (separated by a dislocation clay in places), all provide evidence of an intense folding as well as of displacements along shallow-dipping planes. The dip of foliation in schists in drill cores varies from 0 to 80º. The tectonic style is also indicated by a strong deformation in gabbros (south of Imbramowice) and a structurally isotropic ultramafite (Majerowicz, 1979), both possibly derived from the deeper basement of this rock series.

Nine metabasite samples from the discussed area were analysed for trace elements and Sm-Nd isotope ratops. As shown on several digrams (Majerowicz and Pin, 1994) four of the analysed samples display different geochemical patterns.

Two of them are only slightly enriched in LREE and Nb (Zr/Nb ~ 13) and have relatively high εNd values (ca. +7). The other two are clearly LREE and Nb depleted and display the highest εNd values (ca. +8), indicating a depleted N-MORB like magma source.

Summing up, the mafic rocks of the area north of Mt. Ślęża, in contrast to the Ślęża ophiolite rocks themselves, represent a rather inhomogeneous assemblage, with transitional-to-alkaline basalts prevailing. Only minor varieties are geochemically close to typical N-MORBs. This assemblage may represent either a rift environment or a mixture (melange?) of rocks resembling ocean floor and seamount basalts. Further constraints on the most probable setting could be obtained form a more detailed study of the associated metasedimentary rocks.

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