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## THE GEOTECTONIC POSITION OF THE KŁODZKO-ZŁOTY STOK GRANITOIDS

### INTRODUCTION

The Kłodzko-Złoty Stok granitoids is localized in the northeastern part of the Kłodzko district in the border zone between Middle and East Sudetes near the marginal Sudetic fault. The geological boundaries of the massif are very diversified owing to its particular tectonic position. On the east and south the massif is bordered by the Łądek-Śnieżnik metamorphic unit built of mesozonally metamorphosed rock assemblages (Vendian – Lower Cambrian, Gunia 1984, 1989; Turniak et al. 1998), and by Skrzyznka tectonic zone, where rock suite is characterised by cataclasis and mylonitisation of various intensity. On the west and northwest the massif abuts against the Kłodzko metamorphic unit, where the rocks being transformed under the greenschist/amphibolite facies conditions (Lower Palaeozoic – pre-Upper-Devonian), and the Bardo structure composed of rocks nearly unaffected by metamorphic transformations (Upper Palaeozoic - Lower Carboniferous : Visean 345-325 Ma, Oberc 1972). Northeastern boundaries of the massif are marked by fault zones : the Sudetic marginal fault.

### ROCKS OF THE GRANITOID MASSIF

Rocks of the Kłodzko-Złoty Stok granitoid massif are represented mainly by hornblende-biotite granodiorite with transitions to granite, tonalite, quartz monzodiorite, diorite, syenite and granogabbro, that various kinds of rocks of the massif show structural similarities. They are marked by directional arrangement of the coloured minerals segregations against the lighter background. The individual varieties are linked among each other by gradations and this is why their precise delimitation is, as a rule impossible. Among the Kłodzko-Złoty Stok granitoid rocks the most common variety appears to be represented by dark gray, medium grained, occasionally porphyritic and porphyraceous granodiorites built up of plagioclase, biotite, hornblende, microcline, varying amounts of quartz, pyroxene relics, and olivine. Among the accessory minerals apatite, zircon, iron oxides, sphene, rutile and garnet are the most common ones. The mineral constituents are unevenly distributed in the matrix. The coloured minerals (biotite, amphibole,

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pyroxene) form distinct segregations arranged in streaks in the light matrix and accentuating the planar flow structures in the massif.

The geochemical characteristics of the Kłodzko-Złoty Stok granitoids are based on 50 analyses of major elements (published by Finckh et al. 1942; Wierzchołowski 1976; Wojciechowska 1977 and Lorenc 1991) which a marked geochemical heterogeneity: SiO<sub>2</sub> ranges from 52,67 to 79,87 wt %; Al<sub>2</sub>O<sub>3</sub> – 9,37 – 17,02 %; K<sub>2</sub>O – 1,15 – 4,90 %; Na<sub>2</sub>O – 2,02 – 4,60 % and CaO 0,59 – 8,53 %. Most of the Kłodzko-Złoty Stok granitoids are metaluminous with transitions to peraluminous and belong to the calc-alkaline series with transitions to the tholeiitic series.

The Kłodzko-Złoty Stok granitoids are characterized by the presence of numerous exogene enclaves. Generally, the enclaves are known from contact zones between the massif and its cover.

#### CONTACT BETWEEN MASSIF AND COUNTRY ROCKS

The contacts between the country rocks and the granitoids are clearly intrusive and discordant. Wide aureole of thermal transformations can be observed along contacts of the massif against its cover. Four deformation events D<sub>1</sub> – D<sub>4</sub> which produced mesoscopic F<sub>1</sub> – F<sub>4</sub> folds, L<sub>1</sub> – L<sub>4</sub> lineations and S<sub>1</sub> – S<sub>4</sub> planar structures have been documented in the cover of the massif, Wojciechowska (1972), which were closed up to the zones of thermal aureole.

The Kłodzko-Złoty Stok granitoids massif is surrounded by contact metamorphic rocks altered from sedimentary rocks recrystallized under influence of the intrusion. The contact aureole of the massif is built up of andalusite – cordierite hornfelses, wollastonite hornfelses, garnet – cordierite hornfelses, pyroxene – plagioclase hornfelses, chiastolite schists and various contact metamorphic rocks. Various-sized enclosures and the roof pendants have been found to consist of cordierite hornfelses, amphibole – pyroxene – biotite hornfelses and silicate rocks. The thermic influence of the intrusion appeared up 2,5 km away from the contact (especially in Kłodzko metamorphic unit). The mineral assemblage displays a distinct high-temperature of the granitoid magma while intruding (presence ortho- and clinopyroxene indicates temperature of ~770<sup>0</sup> C and low pressure?).

The Kłodzko-Złoty Stok granitoids massif truncates the disturbed country rocks. Its internal structure may be reconstructed by tracing the flow structures accentuated by the orientation of coloured minerals segregations. Three domes (i. e. cupola) discerned within the massif, which elongations correspond to the orientations of F<sub>3</sub> folds occurring in the cover. K/Ar method of isotopic age determination has resulted in 298 Ma as the age of the consolidation may be related to magma emplacement.

The massif and its cover are cut by numerous leucocratic (aplite, pegmatite, fine-grained varieties of granitoids) and melanocratic (spessartite, vogesite) veins of varying thickness. The borders between the massif rocks and the veins are sharp.

## CONCLUDING REMARKS

Intrusion of the Kłodzko-Złoty Stok granitoids took place within already deformed cover.

The top of intrusion cuts discordantly various horizons of the country rocks producing broad, high-temperature contact zones (including: garnet – pyroxene hornfelses).

On the basis of whole-rocks geochemistry (major elements), both I- and S-type varieties can be identified within Kłodzko-Złoty Stok granitoids what might have suggested the presence a mixed magmas.

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