

# Preliminary Data on P-T Conditions of Metamorphism of Metapelites from the Stronie Group (Orlica-Śnieżnik Dome, Sudetes, SW Poland)

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## Introduction

The Stronie Group is part of the Orlica-Śnieżnik Dome. The group consists mainly of paragneisses and mica schists with intercalation of quartzites, marbles, amphibolites and quartz-graphitic schists. Despite numerous contributions to tectono-metamorphic evolution of the Łądek-Śnieżnik metamorphic massif there is still considerable debate about their metamorphic and structural evolution (Don et al. 1990).

## Methods of investigation

Paragneisses from Młynowiec (1 sample), Krowiarki Range (1 sample), Żmijowiec Range (2 samples) and mica schist from Sienna were studied by electron microprobe. Temperatures of metamorphism were calculated using garnet-biotite thermometer (Hodges and Spear 1982). Pressures of metamorphism were calculated using GMBP geobarometer (Hoisch 1990).

## Petrography

The paragneisses and mica schists consist mainly of muscovite, biotite and quartz, with varying amounts of plagioclase (1-71 vol. %). With the exception of paragneisses from the vicinity of Młynowiec, muscovite prevails over biotite. In some places biotite is almost totally replaced by syndeformational chlorite. Accessories are garnet, staurolite, tourmaline, chlorite and epidote. Sillimanite, kyanite and andalusite occur locally. Paragonite, margarite, chloritoid and staurolite are present as inclusion in garnets.

## Mineral chemistry

*Muscovite* contains significant amounts of paragonite ( $(Na+K)=0.32\pm 0.14$ ) and phengite ( $Si^{IV}=6.20\pm 0.08$  a.p.f.u.). *Biotite* composition shows significant differences between samples. The  $X_{Fe} [=Fe/(Fe+Mg)]$  ranges from 0.43 to 0.62 and is the lowest among samples containing syndeformational chlorite. *Garnet* is almandine, usually with normal growth zoning pattern. Its composition varies significantly from sample to sample. In paragneisses the cores have mostly composition  $Alm_{53-64}Py_{3-6}Spe_{20-33}Gr_{10-11}$  and the rims  $Alm_{63-80}Py_{5-9}Spe_{5-23}Gr_{5-9}$ . In paragneisses from the vicinity of Młynowiec the garnets are enriched in pyrope and have composition  $Alm_{66-72}Py_{8-22}Spe_{8-16}Gr_{5-8}$ . Two types of garnets of different zoning pattern occur in mica schists. The first one is characterized by normal growth zoning pattern and has composition  $Alm_{69}Py_8Spe_4Gr_{19}$  in core and  $Alm_{74}Py_9Spe_2Gr_{15}$  in rim. The second one has reversed growth

zoning pattern and composition  $Alm_{70-71}Py_{5-7}Spe_{10-11}Gr_{12-13}$  in core and  $Alm_{54-69}Py_{9-10}Spe_{8-14}Gr_{13-22}$  in rim. The porphyroblasts of *albite* ( $An_{1-7}$ ) and grains of oligoclase ( $An_{10-12}$ ) typically occur. Reversely zoned ( $An_{8-19} \rightarrow An_{14-25}$ ) oligoclase dominates in paragneisses from the vicinity of Młynowiec. In mica schists plagioclase has andesine composition ( $An_{38-43}$ ).

## Metamorphic conditions

The temperatures calculated for the paragneisses range between 505 and 545 °C. Pressures for grains of oligoclase were calculated at  $7.9\pm 1.0$  kbar. Similar temperatures and pressures were obtained for garnet with normal growth zoning pattern ( $540\pm 10$  °C,  $7.5\pm 1.0$  kbar) in mica schists. Calculation performed with reversely zoned garnet yielded 580-615 °C. The paragneiss from vicinity of Młynowiec showed temperatures ( $590\pm 20$  °C) higher than the other samples under similar pressures ( $7.5\pm 1.5$  kbar).

## Conclusion

The calculated temperatures and pressures are not fully consistent with the results obtained by previous workers. Wojciechowska (1986) estimated temperatures of 550-650 °C and pressures of 5.5-6.4 kbar for rocks of the Stronie Group. Bröcker and Klemd (1996) obtained temperatures of 600-620 °C under pressures 7-9 kbar for the Gierałtów gneisses.

## References

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