

Microstructural Analyse of Orthogneisses from the North-Eastern Part of the Bystrzyca Mts., West Sudetes

Natalia BIEGAŁA

Institute of Geology, Adam Mickiewicz University, Maków Polnych 16, 61-606 Poznań, Poland

Orthogneisses are one of the main lithological varieties in the Bystrzyca Mts., which is part of Orlica-Śnieżnik Dome, the easternmost unit of West Sudetes. Specimens were taken from the outcrops in Równia Łomnicka and Mostowice-Jagodna area. The main purpose of the analyse was determining temperature, kinematics and geometry of deformation, to which the gneisses were subjected. The method used in this study was measuring of the quartz *c*-axes orientation.

Diagrams for the eastern part of the Mostowice – Jagodna area are very similar. All indicate constrictional deformation (type II crossed girdles) under amphibolite facies temperature conditions. The microfabric asymmetry is “top-to-the-N”. These gneisses could be classified as L<S tectonites (augen to augen-laminated) and S-tectonites (thin laminated).

Diagrams for the western part of this area are similar, but not so clear, and could indicate simple extension. C-axes microfabric shows asymmetry consistent with field observations of kinematics indicators (σ - or δ -clasts), but changing through the area. Deformation kinematics is here “top-to-the-S-SW”. Gneisses have rodding texture (L-tectonites).

Diagrams for the Równia Łomnicka gneisses represent not fully-developed cross girdles. Sometimes it is hard to find, if it is type I or II. Positions of the maxima indicate also deformation in amphibolite facies conditions. Fabric asymmetry, consistent with field observations, is “top-to-the-N”. These rocks have features characteristic for L-S-tectonites.

Spatial differentiation of deformation kinematics (top-to-the-N, top-to-the-S) with almost identically oriented foliation (gently dipping to the SW) is probably caused by folding of mylonitic foliation during the later tectonic event. It could be confirmed by existence of mineral lineation superimposed at low angle to earlier elongation lineation.

Summing up, texturally diversified Bystrzyca gneisses are metagranitoids. Deformation transforming granites into orthogneisses was multiphase. The stages were:

1. extension, that caused elongation of quartz-feldspar aggregates – lineation L_1 ,

2. flattening and shearing “top-to-the-N”,

3. folding with eastern vergence, that caused mica flakes orientation – mineral lineation L_2 .

Two first stages consisted in mylonitization connected with recrystallization of the gneisses mineral components.

Results of the quartz microfabric analysis indicate, that during the recrystallization:

- pseudo-hexagonal prism planes system in $\langle a \rangle$ direction dominated, what connected with maxima situated in the middle of the projection, indicates temperature conditions specific for amphibolite facies;
- strain was non-coaxial.

To a high degree microstructural and mesostructural features in the investigated orthogneisses are consistent.

References

- BLUMENFELD P., MAINPRICE D. and BOUCHEZ J.L., 1986. C – slip in quartz from subsolidus deformed granite. *Tectonophysics*, 127: 97-115.
- CZAPLIŃSKI W., 1997. Mikrowięzba kwarcu i jej wykorzystanie w badaniach skał deformowanych plastycznie. *Przebieg Geologiczny*, 45 (7): 727-731.
- GAPAIS D. and BARBARIN B., 1986. Quartz fabric transition in a cooling syntectonic granite (Hermitage massif, France). *Tectonophysics*, 125: 357-370.
- SCHMID S.M. and CASEY M., 1986. Complete fabric analysis of some commonly observed quartz *c*-axis patterns. *Mineral and Rock Deformation: Laboratory Studies, Am. Geophys. Union Monogr.*, 36: 263-286.
- ŻELAŻNIEWICZ A., 1984. Synmetamorphic penetrative mylonitization in orthogneisses of the Bystrzyca Mts, Sudetes. *Acta Geologica Polonica*, 34 (1-2): Warszawa: 111-130.
- ŻELAŻNIEWICZ A., 1988. Orthogneisses due to irrotational extension, a case from the Sudetes, Bohemian massif. *Geologische Rundschau*, 77 (3): Stuttgart: 671-682.