Quartz <c> Axis Patterns in the Syntectonic Intrusion of the Doboszowice Orthogneiss (Sudetic Foreland, SW Poland)

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The Doboszowice orthogneiss crops out at the eastern margin of the Sudetic foreland near to the East/West Sudetes contact zone. It developed from peraluminous, mostly two-mica syn-collisional granite (Mazur and Puziewicz 1995; Hanžl et al. 1998). The age of the intrusion has been tentatively determined, using single zircon evaporation method, at 379 ±1 Ma (A. Kröner pers. com.). The orthogneiss is leucocratic, consists of potassium feldspar, plagioclase, quartz, biotite and muscovite. Garnet, apatite and zircon are common accessories. Despite its homogeneous composition, the orthogneiss comprises several differentiated textural types. The most common fine-grained banded gneisses are associated with, less abundant, coarse-grained augen and pencil varieties. In recent years, the Doboszowice orthogneiss has been considered a syntectonic intrusion deformed and metamorphosed under lower amphibolite facies conditions (Mazur and Puziewicz 1995).

The Doboszowice orthogneiss is characterized by a penetrative foliation dipping to SW at low to moderate angles and by a conspicuous stretching lineation trending NE-SW. A top-to-NE kinematic indicators were described in the gneisses and interpreted as a record of dextral transpression along the eastern margin of the Bohemian Massif (Mazur and Puziewicz 1995). Preliminary quartz <c> axis analyses indicated, however, an important role of coaxial strain in the deformation of the orthogneiss (Bartz 1997).

The total of 26 representative samples of the Doboszowice orthogneiss were analysed using 3-axis universal stage. Thin sections were cut perpendicular to the foliation and parallel to the stretching lineation. Quartz <c> axis diagrams display an entire spectrum of transitional patterns from (I) type of crossed girdles (Fig. 1 A,B,C,D) to a single girdle inclined to foliation (Fig. 1 G,H,I). Some diagrams (Fig. 1 E,I) show a distinct tendency to scatter along two small circles around the poles to foliation. Quartz <c> axis analysis indicates that total strain of the orthogneisses involved two main components: (1) coaxial strain ranging between pure shear and general flattening and (2) simple shear. Both components are superimposed in various proportions. Vast majority of diagrams demonstrate almost symmetric scatter typical of pure shear, whereas few of them show patterns representative of strain close to simple shear. The inclination of single girdles with respect to the foliation, indicates a top-to-NE sense of the simple shear. Several diagrams (Fig. 1 F) display an almost isotropic scatter which implies local static recrystallization of the rock.

The present study shows that the fabric of the Doboszowice orthogneiss presumably developed due to superposition of prevailing coaxial strain and minor simple shear component. Consequently, our data suggest that the dextral transpression along the eastern margin of the Bohemian Massif was accompanied in the study area by an important non-rotational component related to approximately W-E shortening. The presence of similar coaxial deformation, generally post-dating the emplacement of nappes, has been recently documented in the adjacent mica schists, cropping out around Kamieniec Ząbkowicki (Mazur et al. 1997).

References

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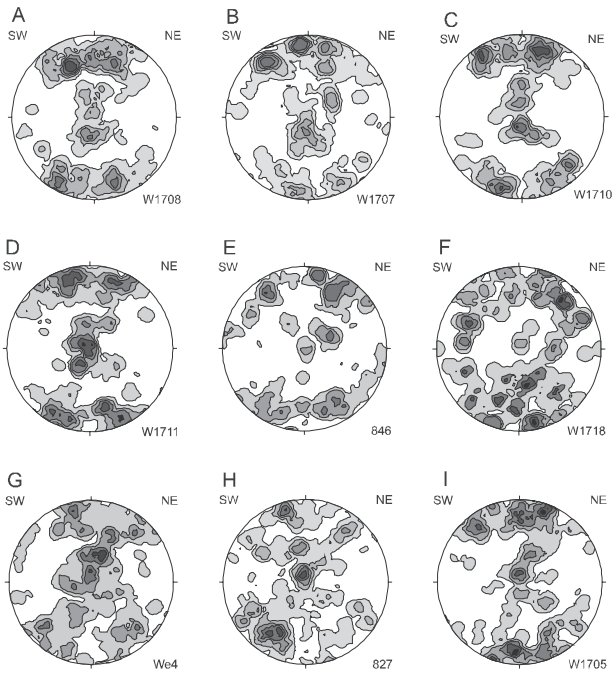

Fig. 1. Representative examples of quartz c-axis patterns in the Doboszowice orthogneiss. Equal-area net, lower hemisphere. Density contours at 1% intervals. Projection plane is XZ plane of strain ellipsoid. Attitude of foliation corresponds to a plane perpendicular to the figure. Lineation (parallel to X axis of strain ellipsoid) trends parallel to the figure.