originated during the Variscan orogeny and became reactivated during the Alpine cycle. The age of correlative sediments indicates that the fault was active in Late Oligocene times already, although many researchers suggested either Middle Miocene or Pliocene as the onset of faulting. Most geologists infer that the fault zone became inactive in the Pliocene; and only few suggested a possibility of continuation of its mobility in Quaternary times, principally due to vertical glacioisostatic motions induced by the consecutive Scandinavian ice-sheet advances and waning tectonic activity of the fault itself. A detailed analysis of terraces of the main Sudetic rivers formed during the past 200 thousand years points to their divergence. The presence of overhanging valleys and rock steps at the outlets of some of these valleys appear to confirm the still existing tectonic mobility along the SMF.

Our cartometric study consisted in the construction of digital elevation models of different portions of the SMF, based on 1:10,000 equal-area topographic maps, and digital determination of topolineaments. Topographic maps transformed into a raster format helped to determine drainage basin parameters of 149 small basins that are located at the base of the Sudetic mountain front, as well as to draw longitudinal profiles parallel to the SMF scarp.

The southern portion of the SMF in Poland, nearly 77 km long, has been studied using morphometric analysis of both scarp and small drainage basin parameters, as well as due to construction of digital elevation models and digital processing of topolineaments. The footwall of the fault is morphologically expressed as a distinct scarp ca. 50 to 400 m high. As a morphological border, the SMF separates two units showing different morphology: the Sudetes, represented by mountain ranges with broad ridges and deeply dissected uplands, of average altitudes of 400–800 m a.s.l. near the fault; and the Sudetic Foreland of gently undulating relief (approximately 200–300 m a.s.l.) composed of scattered groups of hills or slightly dissected uplands. The mountain front is generally higher in the southeastern part (120–300 m between Žulova and Bielawa) and less elevated in the northwestern sector (50–180 m between Bielawa and Złotoryja), although wide differences are noticeable among particular local sectors. The southern portion of the SMF between Złoty Stok and Dobromierz was subdivided into 6 segments, orientated roughly NW (N28°W to N50°W), and ranging from 6.4 km to 17.8 km in length. These segments show different geological setting, variable heights of fault and fault-line scarps, different pattern of triangular or trapezoidal facets, as well as changeable values of physiographic parameters characterizing small-scale drainage basins located at the base of the scarp. Of the six segments distinguished in the investigated fault fragment, the segment situated in the Sowie Mts. shows the highest rate of recent uplift of the footwall, as indicated by very well-preserved triangular facets showing a two-tier arrangement. Morphometric analyses allow us to infer that the most useful parameters to characterize the SMF scarp are the mountain front sinuosity and valley floor width/valley height ratio, whereas the maximum basin relief, relief ratio (i.e., mean basin slope), and basin elongation ratio best describe small drainage basins located at the foot of the scarp. All these parameters clearly indicate that the properties of the Sowie Mts. segment of the SMF do not differ much from those typical for young, moderately active normal fault scarps described from elsewhere. This hypothesis is supported by the results of studies of both topolineament pattern, and digital elevation models of the fault zone. The latter portray very well a two-tier arrangement of triangular facets, resulting from at least two episodes of fairly recent uplift, amounting to some 80 m.

Microstructures, Deformation Mechanisms and Rheology of Metagabbros Deformed in Different Thermal Gradients

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We have investigated two metagabbro thrust sheets (Staré Město belt, Czech Republic) below and above syntectonic tonalitic sill intrusion. The deformation in both sheets is heterogeneous but in the upper metagabbro sheet it is more intense and penetrative due to higher temperature of deformation. The metamorphic temperature estimated using the Hbl-Pl thermometry shows 750±50 °C and 650±50°C in the upper and the lower sheet, respectively.

Magmatic amphiboles from the lower gabbro sheet show magnesium-hornblende composition with slightly increasing tschermakitic component associated with dynamic recrystallization. Similarly, magmatic plagioclase of An45-55 composition shows strong zoning towards the rims (An60). The recrystallized new grains vary in composition from An42 to An62. Magmatic amphiboles from the upper gabbro sheet also exhibit the magnesium-hornblende composition, and they evolve towards tschermakite or ferro-tschermakite with progressive recrystallization. Magmatic plagioclase shows An50-60 content, while the composition of recrystallized grains is varibale ranging from An45 to An90.

Amphiboles and plagioclases of the lower gabbro sheet are characterized by the "core and mantle" structure in the less deformed samples. At higher strains, plagioclases and majority of amphiboles are completely recrystallized. Magmatic amphiboles with unsuitable orientation of the glide system are locally preserved as "locked-up" sigmoidal porphyroclasts parallel to the macroscopic foliation. In the upper sheet, most of the magmatic amphiboles and plagioclases are recrystallized forming monomineral bands of 0.1 – 1 cm in size. The plagioclase-plagioclase grain boundaries are strongly serrated, while the amphibole-amphibole boundaries are mostly straight and equilibrated.

The quantitative microstructural analysis shows in the lower gabbro sheet an important increase in shape preferred orientation (SPO) of amphiboles and slight increase of SPO of plagioclase with increasing deformation. Both minerals achieve higher aspect ratio but they do not exhibit change in grain size distribution with increasing strain intensity. On the contrary, the SPO in the upper gabbro sheet as well as the aspect ratio of amphiboles slightly decrease with increasing deformation, whereas these parameters in plagioclases remain unchanged. Moreover, the grain size of amphibole decreases, while that of plagioclase increases with progressive deformation.The electron backscatter diffraction (EBSD) measurements of crystal preferred orientation (CPO) reveal similar trends for both metagabbro sheets. Amphibole is marked by a relatively strong CPO already at lower deformation intensities, whereas plagioclase displays very weak CPO. With progressive deformation, the CPO of amphibole further strengthens and becomes entirely random for plagioclase.

The quantitative microstructural analysis and the EBSD study suggest that the deformation on a microscale changes depending on temperature and degree of deformation. In the lower sheet, the magmatic grains of amphibole firstly rotate to the easy slip direction, which is represented by the (100)[001] glide system oriented parallel to the foliation and lineation. When this orientation is achieved, the dislocation creep on (100)[001] takes place together with activation of (110)[001] weak cleavage planes inducing a strong rock anisotropy at high deformation intensities. Plagioclase recrystallizes mostly by fracturing and nucleation of new grains occurring in the highly strained zones and to limited extent by mechanism of subgrain rotation. At high strains, the deformation mechanism switches to grain boundary diffusion creep, which is a grain-size sensitive process resulting in a random CPO. In the upper sheet, most of the longest axes of magmatic amphiboles are already oriented parallel to the foliation, and the predominant (100)[001] glide is active. Moreover, the dislocation glide is accompanied by chemically induced grain boundary migration, which is manifested by different composition of the new and old grains. On the contrary, the plagioclase recrystallizes by subgrain rotation mechanism. At the later stages, the dominant recrystallization mechanism is grain boundary migration, which is either chemically or strain induced. It is indicated by strongly serrated plagioclase-plagioclase grain boundaries as well as by important differences in the plagioclase compositions. The processes described above result in strong anisotropy of the whole rock.

Petrography and Succession of Granitoids from the Southern Part of the Strzelin Crystalline Massif (SW Poland) – Preliminary Data

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The Strzelin crystalline massif is located in the eastern part of the Fore-Sudetic Block c. 40 km SE of Wrocław, SW Poland. The unit consists of gneisses (Upper Proterozoic – Cambrian), older schist series (Precambrian or Lower Paleozoic) and younger schist series corresponding to Lower–Middle Devonian quartzites of the Jegłowa Member (Oberc-Dziedzic, 1999). Metamorphic rocks are intruded by Variscan granitoids. Oberc-Dziedzic (1991, 1999) documented three episodes of granitoid emplacement into metamorphic rocks represented by intrusions of tonalite and quartz diorite, biotite granite and two-mica granite. The biotite granite was dated at 347 ± 12 Ma and the two-mica granite yielded the age of 330 ± 6 Ma (Oberc-Dziedzic et al., 1996). According to Oberc-Dziedzic (1991, 1999), small bodies of granodiorite in the southern part of the massif may represent an onset of magmatic activity. Nevertheless, this has not been proved yet.

This paper focuses on granitoids encountered in boreholes (B-1, B-2, W-1, De-1) drilled in the SE part of the massif. Five varieties of granitoids were identified in the investigated drill cores: granodiorites and subordinate biotite tonalites, fine-grained biotite-hornblende tonalites, medium-grained biotite-hornblende tonalites and two-mica granites. Non-plutonic rocks in the drill cores are gneisses (fragments of the metamorphic envelope of the granitoids). Granitoids form small intrusive bodies, mainly compound dykes a few metres to several centimetres thick. Thin dykes mainly follow foliation in gneisses whereas thick ones are discordant. Some granitoids were emplaced into shear zones. Only scarce alteration is observed on contact between granitoids and their envelope. A fine-grained rim of granodiorite 1 cm thick impoverished in biotite occurs at the contact.

Granodiorites are coarse- to medium-grained, locally porphyritic, with parallel alignment of biotite flakes. Both plagioclase and K-feldspar exhibit zonal structures. Granodiorites also consist of quartz, whereas zircon and apatite are accessories.

Biotite tonalites are fine-grained, with parallel alignment of biotite and plagioclase. Plagioclase porphyrocrysts occur in fine-grained matrix consisting of plagioclase, biotite and quartz. The porphyrocrysts are characterized by strongly serecitized cores and recovered mantles. Clusters of several biotite