cordierite. A low frequency of garnet having a low Grs and Prp content is in line with the prevalence of late, low-P mineral assemblages in the Kaplice unit.

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CONJUGATE SHEAR ZONES IN THE SOUTHERN BOHEMIAN MASSIF: KINEMATICS DURING DUCTILE AND BRITTLE BEHAVIOUR

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Mylonitic fabrics which developed in wrench fault systems of the Southern Bohemian Massif display dextral shear sense in the NW-SE striking systems and sinistral shear sense in NE-SW trending systems. Ductile fabric elements were studied in both systems.
In the Danube Shear Zone (along the Danube between Eferding and Passau) diatexites and metablastites are ductilely deformed into protomylonites. A mylonitic foliation dips steeply NNE to NE, and an almost horizontal stretching lineation in the direction of strike is well penetrative. Mesoscopic and microscopic S-C fabrics and shear bands indicate a dextral shear sense. X-ray textural goniometer analyses of quartz fabrics in (xz)-sections show that the c-axes are arranged in dextrally oblique girdle distributions. The a-axes form a cluster distribution in the S-direction of the S-C fabric. Temperatures cannot have exceeded those of greenschist metamorphism because the feldspar porphyroclasts are brittlely deformed.

In the Pfahl Shear Zone (parallel to the Danube shear Zone in the Mühl Valley), protomylonites derived from a granite or orthogneiss-protolith (Weinsberg Granite, Eisgarn Granite, and "Grobkorn Gneis") are most common along the shear zone margins. Towards the centre of the shear zone, mylonites and ultramylonites are developed. Ductil shear bands, asymmetric pressure shadows, and antithetic "book shelf" structures indicate dextral shear. X-ray textural goniometer analyses of the quartz fabric from marginal parts of the shear zone show similar patterns as in the Danube Shear Zone. In the centre of the Pfahl Shear Zone, however, a prism-c-glide system was activated. This means that temperatures exceeded 700 °C, and that hydrous conditions existed.

In the NE-SW trending Rodl Shear Zone (located in the Rodl Valley) mylonitization and phyllonitization affected a variety of protoliths (Pearl Gneiss, Pearl Diatexite, Weinsberg Granite, and Schlieren Granite). A penetrative, steeply NW-dipping mylonitic foliation and a horizontal NE-SW striking stretching lineation are well developed. From fabrics in meso- and micoroscopic scale a sinistral shear is evident. In highly deformed mylonites a very high flux of fluids can be derived from a complete change of feldspar into sericite. Mineral reactions suggest retrograde metamorphism under greenschist conditions. X-ray textural goniometer analyses of the quartz fabric result in girdle distributions with sinistral obliquity and clusters of a-axes in the direction of the x-axis of the finite strain ellipsoid.

$^{40/39}$Ar dating of various size fractions of muscovites formed during mylonitization yielded ages of 287.3 ± 0.6 Ma (NW-SE system) and 294.5 ± 0.7 - 260.3 ± 0.9 Ma (NE-SW system). The shear zones are, therefore, interpreted as a late Variscan conjugated system. Rb-Sr dating of muscovites yields an age of 190 Ma which is interpreted to indicate partial Alpine rejuvenation.

The shear zones of both directions are affected not only by ductile deformation but also by patterns of brittle slickenside planes with striations which must be younger than the ductile fabric, because they cut through it and because many of them are coated with fresh fault gouges. This means that they were established in a post-Variscan stress pattern. Post-Variscan movement is also suggested for the easternmost Diendorf Shear Zone because it forms a structural boundary for a tectonic graben containing Permian sedimentary rocks. In these young displacement systems slickenside planes, striations, and sense of displacement were measured, and paleostress directions were reconstructed. Identical stress patterns were found for both shear zone directions. The axis of maximum principal stress is oriented horizontally in N-S direction, whereas the axis of minimum principal stress is aligned horizontally in W-E direction. These relationships indicate that within both sets of ductile shear zones, younger brittle deformation acted in a strike slip manner with a shear sense similar to the one which was active with ductile deformation.

These observations lead us to the conclusion that the shear zones in the Southern Bohemian Massif appear to have developed as wrench faults at crustal levels below the brittle-ductile transition. Some developed at very high temperatures (e.g. the Pfahl Shear Zone) and may reflect coincidence of the intrusion of late Variscan Granite (Eisgarn Granite) and initial shearing. ^{40}Ar/^{39}Ar dating suggests that the NW-SE and the NE-SW systems developed simultaneously in the late Variscan. These can be regarded as a conjugate orthogonal system of lateral shear zones. This pattern appears to extend into the Czech sections of the Bohemian Massif and to form a regular regional pattern. One direction (NW-SE) parallels borders of large crustal blocks in Middle and Eastern Europe (Elbe Line and Tornquist-Teisseyre Line) along the southwestern border of the Russian Shield. The other system is perpendicular to crustal block boundaries. The shear zone pattern developed in a broad zone perpendicular to the direction of Variscan convergence of Laurasia and Gondwana. This pattern of dextral and sinistral strike slip zones might be explained as α and β-lines and represents trajectories of maximal shear stresses which developed north of an elongated E-W indenter. During the Alpine orogeny the Bohemian Massif represented a tectonic foreland. At this time a stress field must have been active which was very similar to that in the Variscan. As a result, Variscan shear zones were reactivated at higher crustal levels.

THE KARKONOSZE GRANITE FROM ŁOMNICA, SUDETES, POLAND: ITS TECTONIC POSITION INFERRED FROM GEOCHEMICAL DATA

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Sixty one granite core samples were taken from a 500 m deep borehole localised in the eastern part of the Karkonosze massif near Łomnica village in Polish Sudetes. This granite consists of quartz, plagioclase (An_{30-0}), alkali feldspar, biotite, and ilmenite. Its structure is coarse-grained and porphyric. The granite samples show wide variations in the intensity of secondary processes, such as chloritization, sericitization, and prehnitization. In extreme cases, the whole biotite was replaced by chlorite. The chemistry of the granite was analysed by using the XRF wave-length dispersion method. The accuracy of trace elements determination was about 1 ppm. On the QAP classification diagram (where Q, A, P are normative quartz, alkali feldspar and plagioclase contents) the studied samples cover the fields of granite and granodiorite. The chemical data point to a homogeneity of the granite with normal distribution of mineral-forming elements and a relative low standard deviation value. It seems, that all the investigated granite samples are indicative of the same magmatic event.

Many authors postulate, that there is a correlation between the chemical composition of a granitoid rock and its intrusive environment. This correlation provides a base for genetic interpretations of other granitoid massifs with particular reference to their original tectonic setting. However, the effect of subsequent processes must be concidered to ensure a reliability of this tectonic interpretation. CWOJDZIŃSKI (1979) on the basis of paleomagnetic and geological data suggested, that the Karkonosze granite intruded during a collision event of the Bohemian Massif and the East-European Platform. The aim of this work was to test this hypothesis based on geochemical data.

The tectonic classification of PEARCE et al. (1984) based on trace elements like Rb, Y, Nb, Yb and Ta shows 4 types of granitic rocks: 1. ocean ridge granites - ORG, 2. volcanic arc granites - VAG, 3. within plate granites WPG and 4. collision granites - COLG. According to this classification, the studied granite samples plot at the border between the COLG and VAG fields. The chemical data presented in this paper do not allow a more detailed classification. However, it seems plausible that Yb and Ta distributions would help to classify precisely the studied granite. MANIAR & PICCOLI (1989) classify granitoids into 7 groups according to contents of major elements: Al, Fe, Mg, Ca, Na and K: 1. island arc granitoids - IAG, 2.