The Intra-Sudetic Fault Zone and the Variscan Strike-slip Tectonics in the West Sudetes

Paweł ALEKSANDROWSKI

Instytut Nauk Geologicznych, Uniwersytet Wroclawski, ul. Cybulskiego 30, 50-205 Wroclaw, Poland

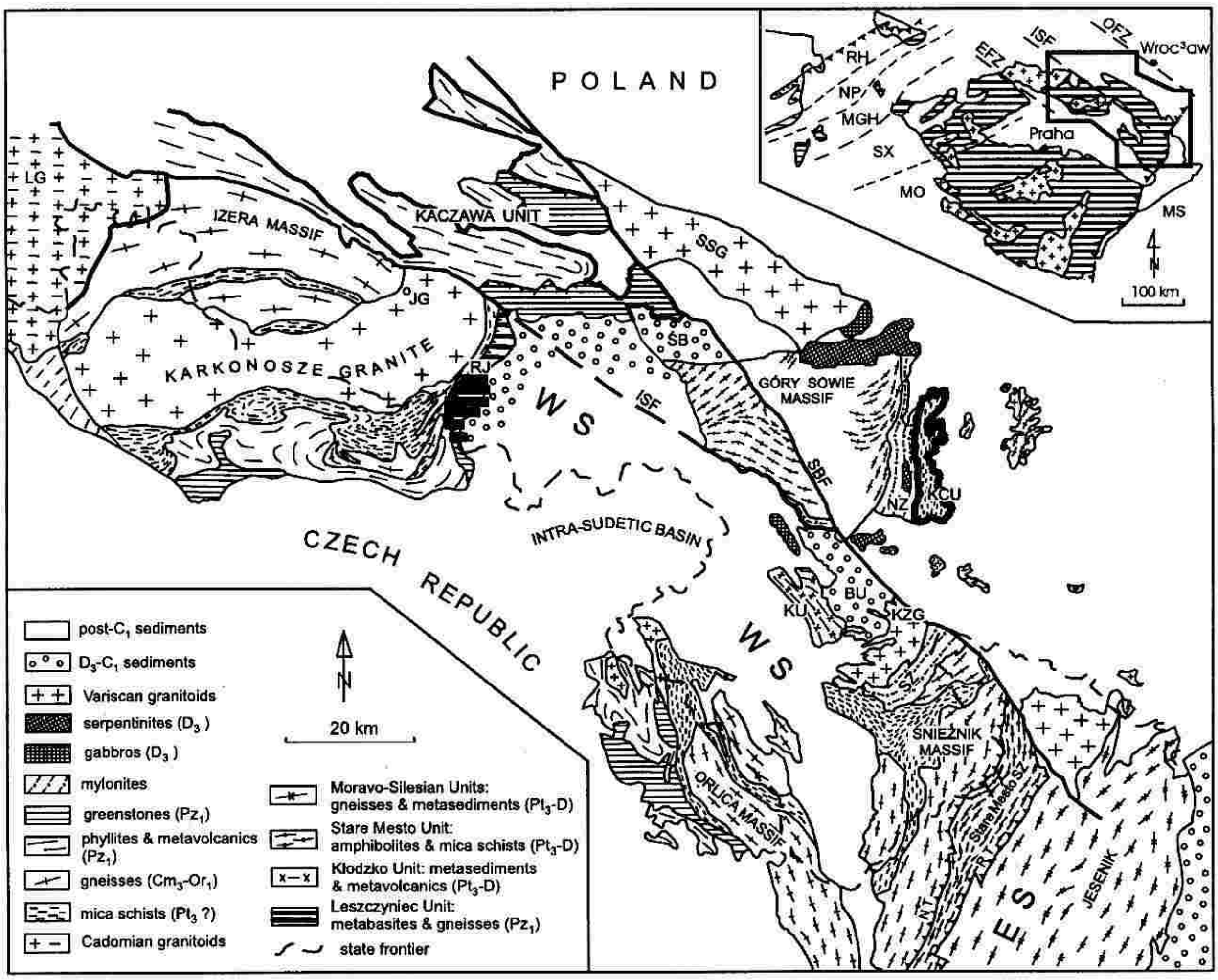

Fig. 1. Outline geology of the Sudetes showing location of studied major strike-slip faults and shear zones. BU - Bardo Unit; ES - East Sudetes; ISF - Intra-Sudetic Fault Zone; JG - Jelenia Góra; KCU - Kamieniec Unit, KU - Klodzko Unit; KZG - Kłodzko-Złoty Stok Granitoid Massif; LG - Lusatian Granitoid Massif; NT - Nyznerov Thrust; NZ - Niemcza Shear Zone; RJ - Rudawy Janowickie Unit; RT - Ramzova Thrust; SBF - Sudetic Boundary Fault; SSG - Strzegom-Sobótka Granite Massif; SZ - Skrzynka Shear Zone; ŚB - Świebodzice Basin; WS - West Sudetes. *Inset*: hachure - pre-Permian crystalline rocks; EFZ - Elbe Fault Zone; ISF - Intra-Sudetic Fault Zone; MGH - Mid-German Crystalline High; MO - Moldanubian Zone; MS - Moravo-Silesian Zone; NP - Northern Phyllite Zone; OFZ - Odra Fault Zone; RH - Rhenohercynian Zone; SX - Saxothuringian Zone. *Age assignments*: Pt_3 - Late Proterozoic; Cm - Cambrian; Or - Ordovician; D - Devonian; C - Carboniferous; Pz -Palaeozoic.

The importance of strike-slip displacements in setting up and modifying the Variscan structure of the Sudetes becomes more and more apparent (Aleksandrowski 1990, 1995, Franke et al. 1995). Many of still highly disputable terrane boundaries in the Sudetic segment of the Variscan belt (Matte et al. 1990, Oliver et al. 1993, Cymerman et al. 1997) seem to follow major, syn- to post-orogenic strike-slip faults and shear zones (Aleksandrowski et al. 1997), which have dissected and dismembered the primary fabric of the Variscan belt, probably analogous to the structure of mid-German Variscides. The most conspicuous strike-slip feature, cutting the West Sudetes into halves, is the WNW-ESE Intra-Sudetic fault zone, parallel and structurally equivalent to the Elbe and Odra faults which border the Sudetic area from the SW and NE, respectively (Fig. 1). The Intra-Sudetic fault zone separates several different structural units of the West Sudetes. None of the units, except for the Intra-Sudetic basin (partly syn-tectonic but mostly younger than the fault), can be traced across the fault zone (but see opposite views of Cymerman et al. 1997), which corroborates its net strike-slip kinematics and large-scale of displacement. The Intra-Sudetic fault zone showed ductile dextral activity and, probably, a displacement magnitude of the order of hundreds of kilometres (Aleksandrowski 1990, 1995) during Late Devonian(?) - Early Carboniferous times. During

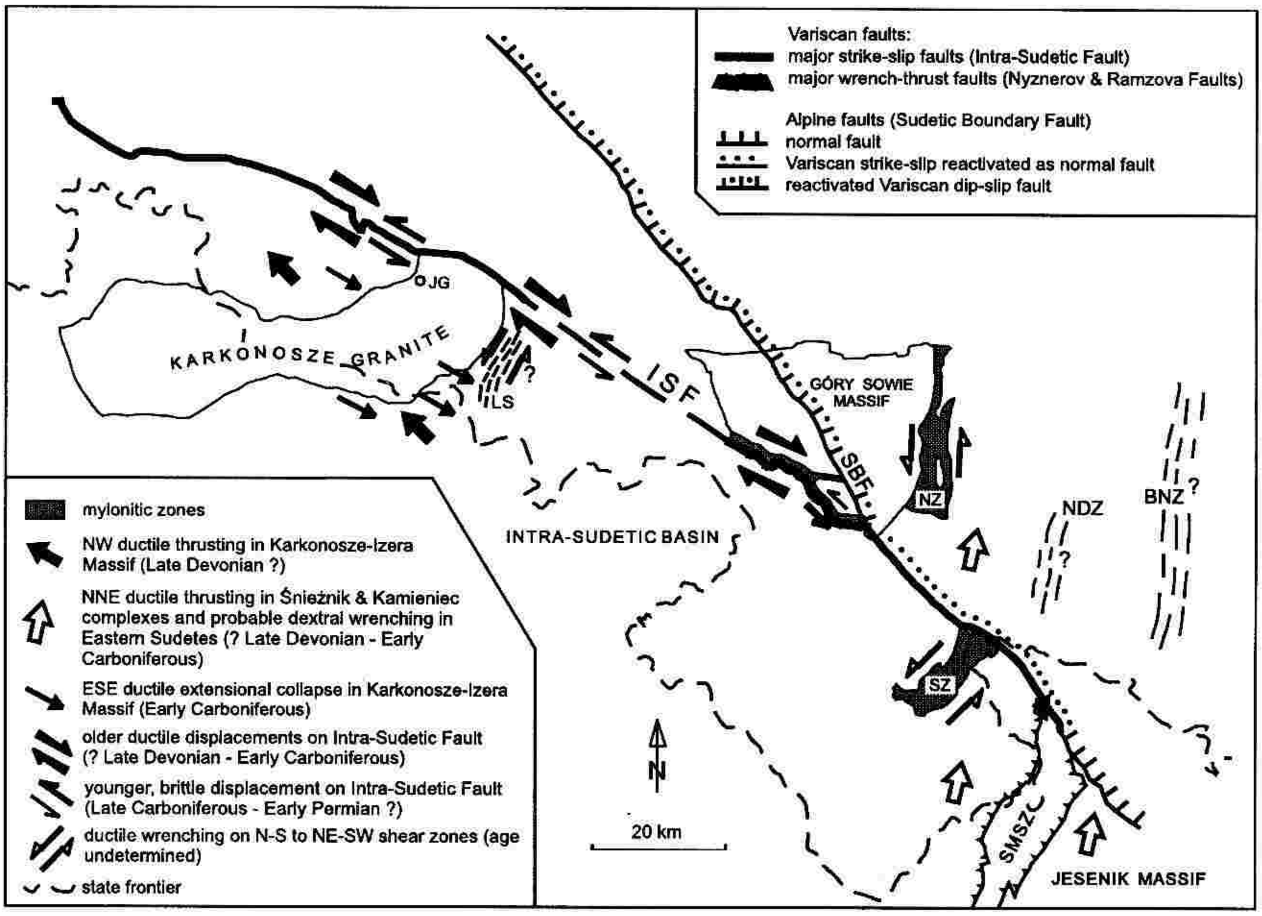

Fig. 2. Generalized kinematic data on major strike-slip faults and shear zones from the Polish Sudetes. BNZ - Brzeg-Nysa Shear Zone; ISF - Intra-Sudetic Fault Zone; JG - Jelenia Góra; LS - Leszczyniec Unit; NZ - Niemcza Zone; NDZ - Niedźwiedź Shear Zone; SBF - Sudetic Boundary Fault; SMZ - Stare Mesto Shear Zone; SZ - Skrzynka Shear Zone.

the Late Carboniferous (to Early Permian?) the sense of motion on the Intra-Sudetic fault was reversed in a semi-brittle to brittle regime, with a left-lateral offset on the fault amounting to single kilometres (Aleksandrowski et al. 1997). The interpretation of the Intra-Sudetic fault as a Caledonian sinistral suture by Oliver et al. (1993) is considered to be incorrect as it overlooks important local and regional geological constraints (Aleksandrowski 1994, Aleksandrowski et al. 1997). The N-S trending Niemcza and NE-SW Skrzynka shear zones are left-lateral, ductile features in the eastern part of the West Sudetes (Mazur and Puziewicz 1995, Cymerman 1996). The age of sinistral motion on them is still undetermined. Similarly oriented (NE-SW to NNE-SSW) regional size shear zones of, as yet, unrecognised kinematics were discovered in boreholes under the Cenozoic cover in the eastern part of the Sudetic foreland (the Niedźwiedź and Nysa-Brzeg shear zones, Cymerman 1991). One of these is expected to represent the northern continuation of the Stare Mesto shear zone, separating the geologically different units of the West and the East Sudetes. The field data on the sense of shear collected to date from major fault and shear zones in the West Sudetes, are compatible with a strike-slip model of the NE margin of the Bohemian Massif, in which the Kaczawa and Góry Sowie Units underwent Late Devonian - Early Carboniferous SE-ward long-distance displacement along the Intra-Sudetic fault zone from their hypothetical original position within the Northern Phyllite Zone and the Mid-German crystalline zone of the German Variscides, respectively, and were juxtaposed with units of different provenance SW of the fault (Aleksandrowski 1990, 1995).

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Comparative Sedimentology and Stratigraphy of Deep-Water Siliciclastics of the Mírov Culm and Part of the Zábřeh Crystalline Complex

Ondřej BÁBEK and Martin JANOŠKA

Department of Geology, Faculty of Science, Palacký University Olomouc, tř. Svobody 26, 771 46 Olomouc, Czech Republic

Sedimentologic and stratigraphic examination of selected localities in the Mírov Culm and a part of Zábřeh Crystalline Complex (Northern Moravia) indicates that both areas are composed of siliciclastic turbidites and related deep-water deposits showing a remarkable similarity in facies composition and meso- to microscale cyclic development. Four major facies were described and interpreted as hemipelagic muds, possible contourites, low density- and high density turbidity current deposits (Facies E2.2, E1.3, D2.3, C2.3, B1.1, A2.5 and A1.4 of Pickering et al. 1986). Facies composition and occurrence of distinct thinning- and fining-upward autocyclic units, interpreted as products of a channel migration, indicate deposition in a submarine middle fan environment, which is supported by trace fossil assemblages of *Nereites* ichnofacies. As suggested by previously published, sparse biostratigraphic data, both the Mírov Culm and the respective part of Zábřeh Crystalline Unit are possibly Devonian in age. The resemblance foreshadowed above may have ensued from a fact that both the units were deposited jointly in a single depositional setting. Examination of stratigraphic way-up indicators (normal grading, sole marks) revealed that some sections in both the units have been tectonically inverted, thus indicating a complicated tectonic fabric of the study area.

As we assume, though comprising two different geologic units the study area may represent a single, deep-marine turbidite depocentre which, providing that it is of Devonian age, is the most interior, topmost, and oldest tectonic unit of the Moravo-Silesian Culm.

Chloritoid-Biotite Assemblage as a Witness of Intermediate MP/LP-Metamorphism in the Královský Hvozd Unit, Moldanubicum, Bohemian Massif

Jiří BABŮREK

Czech Geological Survey, P.O. BOX 85, Klárov 3, 118 21 Praha 1, Czech Republic

The Královský Hvozd Unit (KHU) belongs to the least metamorphosed areas in the whole Moldanubicum. It comprises a region in the SW part of the Bohemian Massif, in the north separated from the Kdyně-Neukirchen basic Massif (already Bohemicum) by the Central Bohemian Fault (CBF).

In the northern margin of the Královský Hvozd Unit, bound by CBF, fine-grained garnet-chlorite-muscovite schists occur. Garnet grains are small in size (up to 1 mm) and show a strongly prograde metamorphic evolution. Spessartine component decreases from core to rim (55 mol% - 25 mol%) and almandine (35 mol% - 55 mol %) or pyrope (5 mol% - 12 mol%) components increase, as well as the content of grossular (8 mol% - 18 mol%). X^{fe} ratio decreases from core to rim from 0.9 to 0.8. Plagioclase is pure albite (An_{02} - An_{03}) and muscovite conserves a higher phengitic substitution (3.38 $Si^{p.f.u}$). Biotite is still unstable and thus Fe-Mg exchange between garnet and muscovite could be delimited. Garnet-muscovite thermometry yields temperature values of 425-450°C, and phengite barometry of associated metagranites gives pressure estimation of 8-10 kb. Therefore, the data presented testify to MP/LP Barrovian greenschist facies conditions of the metamorphism in the northern margin of KHU and SW margin of conventional Moldanubicum.

The structurally underlying rocks form mostly medium-grained mica schists. Their equilibrium assemblage changes from staurolite-biotite-garnet (the latter partly consumed) to andalusite-garnet-staurolite. The textural features indicate crossing the univariant reaction curve grt+chl+ms=