spond to two separate deformation stages (Svojtka et al. 1999). The early deformation D_1 is constrained by Sm–Nd garnet ages and P-T conditions derived from garnet and ternary feldspar to have a minimum age of 354 Ma corresponding to the HP–HT phase of granulite evolution. The age and P-T conditions of the later deformation are derived from cooling below the Ar–Ar closure temperature in biotite at 326 ± 8 Ma (average of 17 Bt laser spot measurements) and a U–Pb concordant zircon age of a syn-tectonic granite at ca. 320 Ma (Svojtka et al. 1999). This deformation followed the MP(LP)–HT stage of granulite evolution. Inclusions of mantle rocks have often well-preserved magmatic layering that is discordant to the later planar fabric of their host granulites.

In order to determine structural relations between the mantle inclusions and their host lower crustal rocks, we have used the ultrasonic pulse-transmission method (Pros et al. 1998). This method allows us to measure the values of P-wave velocity on rock samples under confining pressure. We can recognize the preferred orientation of propagation of P-waves in an inclusion of garnet peridotite and its host leucocratic granulite (both collected from the same outcrop, ca. 10 meters apart). Garnet peridotite with a macroscopically observed magmatic planar fabric at 86/80 has maximum and minimum velocities of P-waves at 4 kbar of 6,947 m/s and 6,409 m/s, respectively and an anisotropy coefficient of 8.05 %. Although a limited extent of serpentinisation may result in small deviations from typical orthorhombic symmetry of samples composed mostly of olivine, it has only little influence on the orientation of the velocity extremes. The maximum velocity of P-wave in the garnet peridotite corresponds to neither of the macroscopically observed planar fabrics (Fig. 1). The host leucocratic granulite with a macroscopically observed foliation at 296/65 and lineation at 330/54 corresponding to D_2 has maximum and minimum P-wave velocities at 4 kbar of 6,267 m/s and 6,069 m/s, respectively, and an anisotropy coefficient of 3.22 %. Suprisingly the maximum velocity direction in the granulite is near-perpendicular to its foliation and the directions of minimum velocities form a belt that is parallel to the foliation (Fig. 1). Both rock types are likely to have been deformed by an early deformation phase, possibly corresponding to D_1. Given the structural sequence in the granulites (Svojtka et al. 1999), this would suggest that the mantle rocks were emplaced into the lower Moldanubian crust prior to 354 Ma. In addition, another sample of garnet peridotite inclusion yielded a Sm–Nd age of 360 ± 3 Ma (WR and four garnet fractions, including core and rim) and a similar age has been obtained from an eclogite inclusion from the same unit (354 ± 8 Ma, Sm–Nd, WR and two garnet fractions). ε_{Nd}^{355} values of +3.2 and -4.6 and $(^{87}Sr/^{86}Sr)_{355}$ ratios of 0.7013 and 0.7128 for garnet peridotite and eclogite, respectively, suggest that the two inclusions originated from different parts of the mantle or, alternatively, that the eclogite may represent a part of metamorphosed basaltic crust.

Collectively, the available geochronological and structural data suggest that the mantle rocks preserved as inclusions in the granulites could represent a heat source that caused the short-lived thermal spikes on the P-T-t evolution path of the Moldanubian lower crust.

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Mylonites in the Kłodzko Metamorphic Unit – A Record of Pre-Late Devonian Dextral Transpression in the West Sudetes

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Mylonites have been long known in the SW part of the Kłodzko Metamorphic Unit (Fischer and Meister 1938; Wójcik and Gaździk 1958; Wojciechowska 1966). Our recent research has shown, however, that they are much more widespread than reported in previous works. We found a map scale mylonitic band, representing a major shear zone, one among the largest in the Polish Sudetes. Its size is comparable to that of the Niemcza and Złoty Stok–Skrzynka shear zones, which are considered important features in the structure of the Variscan basement. Since the mylonites are unconformably overlain by unmetamorphosed Upper Frasnian(?) and Famennian limestones, they must have formed prior to the Upper Devonian. Here a brief description and a preliminary kinematic interpretation of the mylonites are given.

The Kłodzko Metamorphic Unit represents a relatively small outcrop zone of the crystalline basement which occurs between the Góry Sowie massif and the Orlica–Śnieżnik dome. It is mostly surrounded by Upper Carboniferous to Permian deposits of the Intra-Sudetic Basin. Towards the east, it displays an intrusive contact against the Variscan Kłodzko–Złoty Stok granitoids. Eroded metamorphic rocks of the unit are unconformably covered in the NE by Upper Devonian strata which form the base of the Bardo succession.

The Kłodzko Unit consists of six smaller tectonic elements of different provenance and history, juxtaposed by thrusting and later ductile strike-slip faulting. The SW part of the unit comprises mostly meta-igneous rocks, whereas the NE part is composed of sedimentary and volcano-sedimentary successions. Metagabbros and associated gneisses and metarhyolitoids are exposed in the central SW part of the Kłodzko Unit, between the Orlica Hill and Gołogłowy. These rocks are accompanied by mylonites which are previously mapped as phyllites and hornblende schists (Fischer and Meister 1938; Wójcik and Gaździk 1958). A continuous transition from the metagabbros to mylonites are best exposed in an abandoned quarry on the NE slope of the Orlina Hill and in the valley SW of there. Massive, almost structureless metagabbros grade into mylonites at a distance of a few metres. This transition is associated with a rapid decrease in grain size and the development of intense foliation. Original plagioclase crystals are entirely transformed into an aggregate of albite, epidote and/or zoizite with subordinate prehnite. Hornblende, the main component of the metagabbro, is partly replaced by chloritized biotite, chlorite and fine needles of amphibole, and partly survived as large broken porphyroclasts. The metagabbros were equilibrated under peak metamorphism amphibolite-facies conditions, probably related to a thrusting event. The mylonitization was associated with significant retrogression and occurred under greenschist-facies conditions, indicated by the syn-kinematic growth of chlorite.

The Kłodzko Unit is generally characterized by WNW–ESE lineations and steep to vertical foliations. The mylonitic foliation and lineation are roughly parallel to the foliation and lineation produced by the earlier thrusting event. In several cases, at a scale of individual exposures and samples, the two sets of foliations and lineations display cross-cutting relationships. Furthermore, the mylonitic lineation locally overprints the older foliation, being obliquely superimposed on the earlier lineation. Kinematic indicators in the mylonites consistently show a dextral sense of shear. These are S-C structures, extensional shear bands and asymmetric pressure shadows. Lineation plunging ESE at low or medium angles is mostly related to a dextral strike-slip displacement along steep, S-dipping foliation. There is, however, a considerable top-to-WNW up-dip displacement component which suggests a general transpressive regime. The mylonite zone attains a thickness of up to few hundred metres, which seems to indicate a large magnitude of the displacement.

In the vicinity of Kłodzko, the age of the dextral transpressive event is constrained by the presence of pre-Upper Devonian angular unconformity. The lower time limit for the mylonitization is provided by the early Givetian age of fauna from the crystalline limestone in the NE part of the Kłodzko Unit (Hladil et al. 1999). Consequently, the timing of the dextral transpressive event seems to be restricted to the early Givetian – late Frasnian interval. The mylonitization was probably related to the displacement along the neighbouring Intra-Sudetic Fault interpreted by Aleksandrowski (1995) as a major dextral strike-slip zone. This would mean that the activity of that fault began as early as in Middle/Late Devonian times.

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Complex Investigation of Paleozoic Rocks from Stínava–Repešský žleb Locality (Drahany Upland, Central Moravia, Czech Republic)

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The Drahany Upland (a part of the Rhenohercynian belt of the Central European Variscides) is mostly composed of the Lower Carboniferous flysch formations (graywackes, shales, and conglomerates) with some incorporated bodies of Lower Paleozoic pre-flysch rocks (Silurian shales and carbonates, Devonian basalts, shales, carbonates and iron ores). The area with outcrops