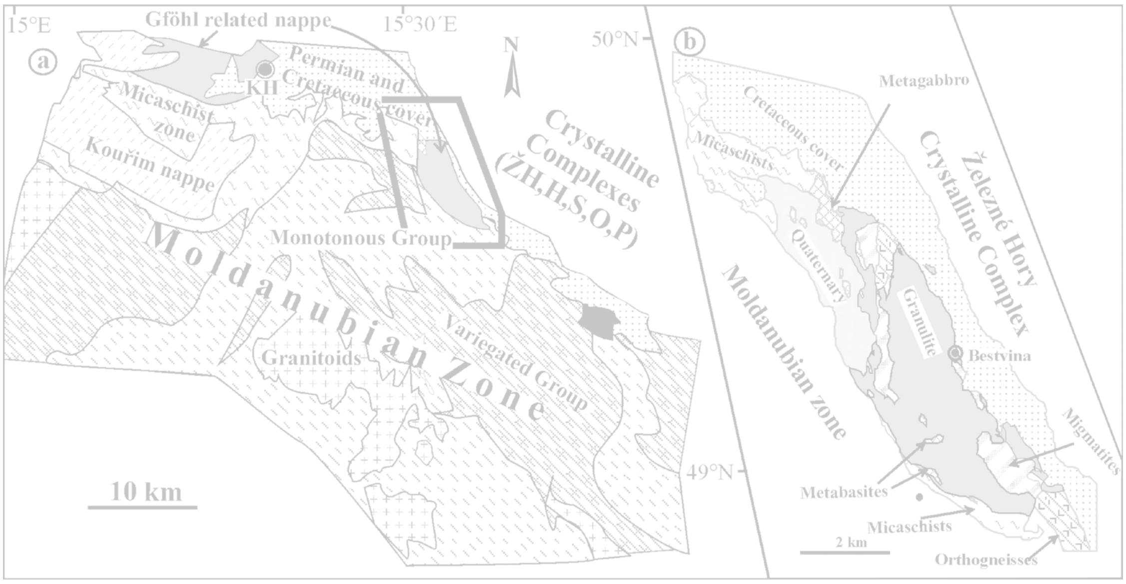
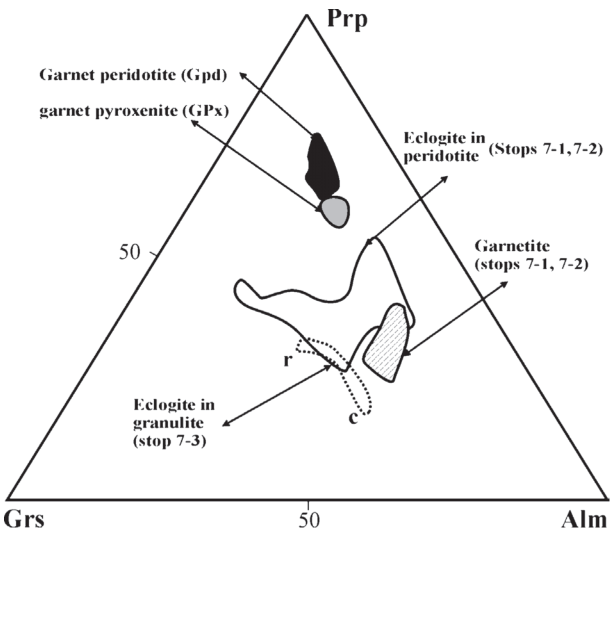
Oliveriová, 1993). The surrounding paragneiss exhibits a penetrative deformational fabric defined by a medium grade foliation dipping at moderate angles towards the NE. This foliation is concordant to the S2 fabric observed in the Běstvina formation (Machek et al., 2009) and the contact between the Monotonous unit and Běstvina formation. The structural relation of this fabric to the peridotite body is unclear. The mafic and ultramafic bodies in the Monotonous unit may have been extruded along the shear zone between the Monotonous and Běstvina units.



■ **Fig. 2.** (a) Simplified geological map of the north-eastern part of the Moldanubian zone and locations of the Gföhl-related units in the Kutná Hora Complex (after Synek and Oliveriová, 1973); Abbreviations: KH, the town of Kutná Hora; ZH, Zelezne Hory complex; H, Hlinsko zone; S, Svratka crystalline complex; O, Oheb crystalline complex; and P, Podohorany crystalline complex. (b) The Bestvina granulite body with associated garnet peridotites and eclogites to be visited on the excursion.

Stop 7-1 (Day 7). Garnet Peridotite and Eclogite, Úhrov, ca. 1 km East from the Village of Úhrov

Coordinates: N49°48′39.5″ E15°33′32.5″



■ **Fig. 3.** Compositions of garnet from garnet peridotite, garnet clinopyroxenite, garnetite, and eclogite from the Kutná Hora complex. Dotted field shows the range of prograde compositional zoning in garnet (c, core; r, rim) from eclogite within granulite (stop 7-3).

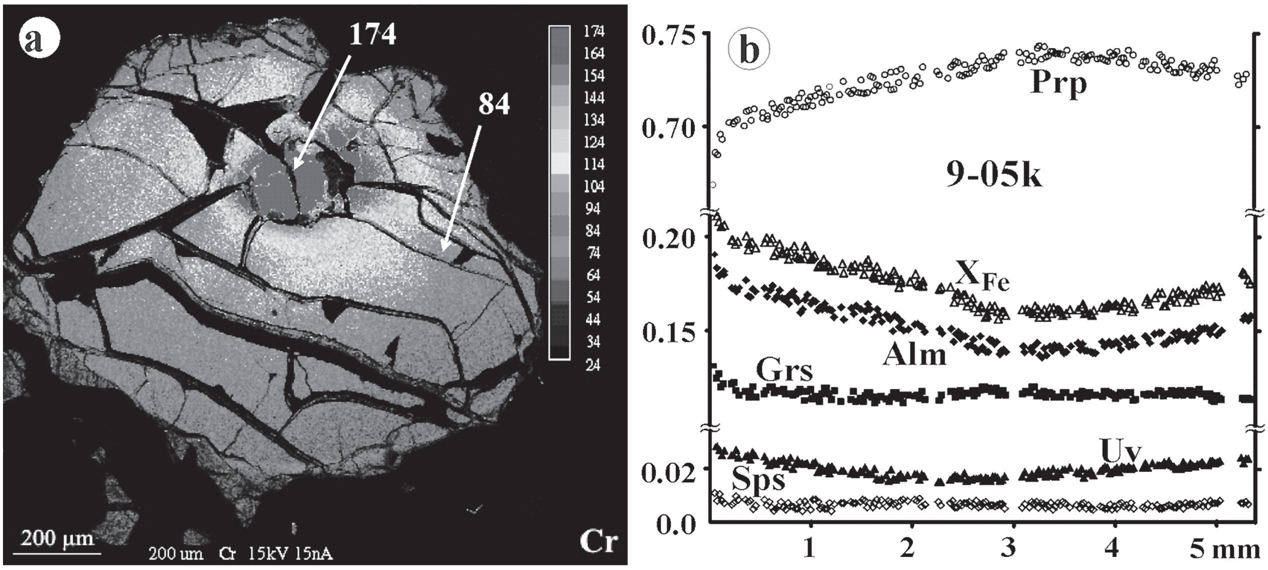
Stop 7-1 can be reached by an asphalt road from Borek to Spačice, but before Spačice turn left on the dirt road to Úhrov, and after 300 m turn northwest (Fig. 1). It is a small outcrop of garnet peridotite with boulders of eclogite in an overgrown, abandoned quarry in serpentinized garnet peridotite.

The garnet peridotite is strongly serpentinized, but contains garnet crystals (up to 5 mm in size) that are mostly rimmed by a thick kelyphitic corona of clinopyroxene ± orthopyroxene + amphibole + spinel (Faryad, 2009). Garnet is rich in Mg (Prp_{66-78}, Fig. 3), with relatively low Fe and Ca contents (Alm_{16-23}, Grs_{12-17}), and the spessartine component is below

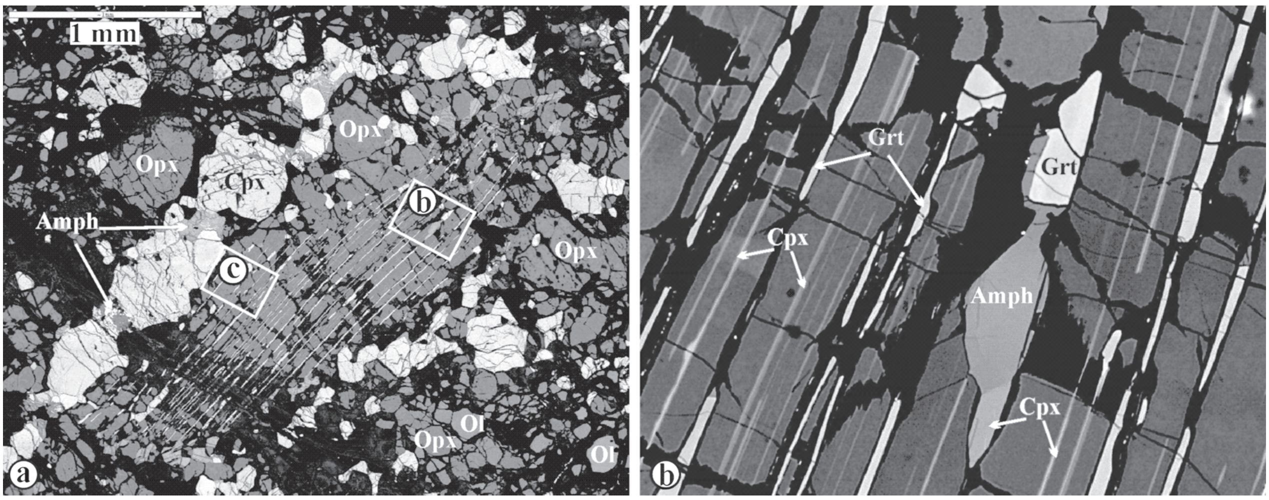
2 mol%. The uvarovite content mostly ranges between 4 and 8 mol%, but it may reach 13 mol % near the contact with Cr-spinel inclusions (Fig. 4a). Garnet crystals are mostly homogeneous with diffusion zoning at grain boundaries as a result of decompression and cooling. However, some garnet grains exhibit grain-scale zoning with a decrease in Mg and an increase of Fe and Cr toward the rims (Fig. 4b). The garnet peridtotite also contains clinopyroxene (Jd_{2-10}), orthopyroxene ($Al_2O_3 = 0.5$ to 1.7 wt%), olivine (Fo = 0.90–0.92), and spinel ($X_{Al} = Al/(Cr + Al + Fe^{3+}$ = 0.38–0.62. Cr-rich spinel with $X_{Al} = 0.38$ occurs as inclusions in garnet or in the serpentine matrix, but more aluminous spinel (X_{Al} = 0.52–0.55 and 0.61–0.68) occurs as fine grains in kelyphitic coronas around garnet. Amphibole (pargasite) is a retrograde phase and occurs within intergranular spaces between garnet and pyroxene, where it may form individual crystals in the serpentine matrix or partly overgrow clinopyroxene + spinel kelyphite around garnet.

Thin layers of pyroxenite (websterite) are present in the outcrop of garnet peridotite. In contrast to clinopyroxenite from other localities, this pyroxenite contains orthopyroxene with exsolution lamellae of garnet and clinopyroxene (Fig. 5b). The orthopyroxene forms porphyroclasts in a fine-grained, recrystallized matrix, consisting of orthopyroxene, clinopyroxene, and small amounts of garnet and amphibole (Fig. 5a). The orthopyroxene porphyroclasts contain garnet and clinopyroxene lamellae that are orientated parallel to the (100) planes of the host porphyroclasts. The lamellar clinopyroxene and garnet are partially replaced by secondary amphibole.

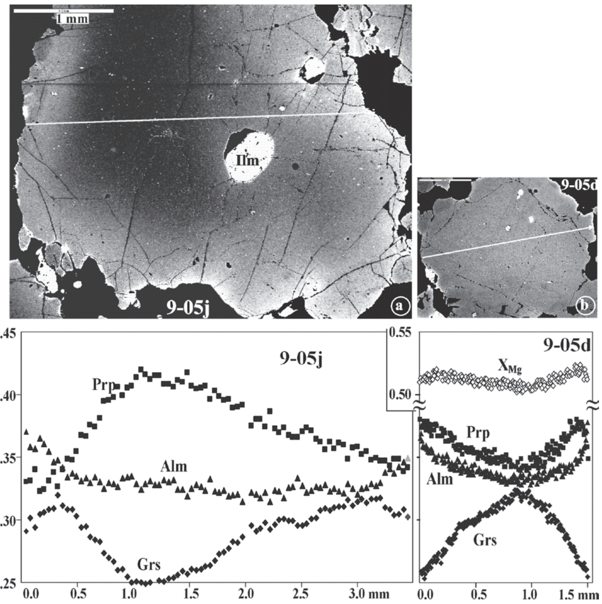
Two varieties of **eclogite**, forming small boudins within garnet peridotite, are present. The most abundant is eclog-



■ **Fig. 4.** (a) Cr X-ray map of garnet with inclusion of Cr-spinel in sample 9b. (b) Compositional profile (rim to rim) of garnet in garnet peridotite showing a rimward increase in Cr and Fe contents and decrease in Mg (sample 9-05k).



■ **Fig. 5.** Backscattered electron images of orthopyroxene porphyroclasts with exsolution products. (a) low magnification view of an orthopyroxene porphyroclast that contains garnet and clinopyroxene lamellae (Faryad et al., 2009). Bright coloured coarse grains are clinopyroxene and garnet. (b) exsolution lamellae of clinopyroxene and garnet in orthopyroxene. Amphibole forms by replacement of clinopyroxene and garnet in the lamellae.



■ **Fig. 6.** Backscatter electron images illustrating contrasting compositional zoning patterns of garnets from eclogite (type II) within the garnet peridotites. In general, garnets (a) and (b) show the opposite sense of core to rim zoning for Grs and Prp.

ite (type I) with garnet (40–60 wt%), omphacite (40–60 wt%), and accessory rutile and apatite, but kyanite-bearing eclogite (type II) also occurs. Garnet is rimmed by a corona of diopsidic clinopyroxene, plagioclase, and amphibole and kyanite is surrounded by a corona of plagioclase, amphibole, and spinel. Garnet from eclogite forms relatively large (1–4 mm) crystals and contains small, oriented rutile needles. Its composition varies from sample to sample (Prp_{37-50}, Grs_{15-34}, Alm_{18-37}) with <1 mol% spessartine and uvarovite contents. The most Mg-rich garnet comes from kyanite-bearing variety. Apart from a systematic rimward increase in Fe and decrease of in Ca in garnet from type I and II, compositional zoning in garnet from type II is different in the different samples (Fig. 6). In some cases, Ca shows an increase in the core with a decrease toward the rim. Omphacite forms up to 1-mm grains that may contain quartz rods. The jadeite content in omphacite ranges from 24 to 28 mol%. The most Jadeite-rich omphacite occurs in type II eclogite. Exsolution lamellae of garnet occur in omphacite from one sample of kyanite-bearing eclogite.

Stop 7-2 (Day 7). Garnet Peridotite, Garnet Pyroxenite, Garnetite and Eclogite. West Bank of the Doubrava River, ca 2 South from the Village of Úhrov

Coordinates: N49°48′33.1″ E15°33′23.9″

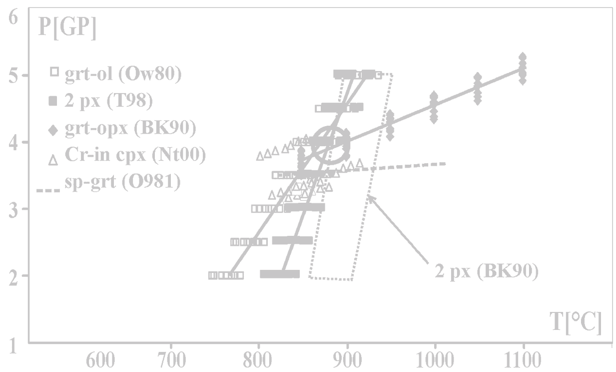
At Stop 7-2, outcrops of garnet peridotite and granulite are exposed along the banks of the Doubrava River. Garnet peridotite occurs in two ca. 100 × 30 m lens-shaped bodies surrounded by coarse-grained and retrogressed granulites. The **garnet peridotite** contains several eclogite bodies (ca. 10–60 cm × 1.8 m in size), but because of poor exposure and small outcrops it is not possible to discern the exact dimensions of these bodies. In contact with, or close to, the eclogites, parallel layers of garnet clinopyroxenite and rarely garnetite with garnet peridotites are present, which are oriented parallel to the shapes of the eclogite bodies. Contacts between garnet peridotite and clinopyroxenite layers are mostly sharp. Although garnet peridotite is strongly serpentinized, fine-grained relics of garnet, olivine, and clinopyroxene are preserved. Minerals in the peridotite at stop 7-2 have a slightly lower Mg/Fe ratio than do those in peridotite at stop 7-1.

Garnet pyroxenite is medium-grained and contains clinopyroxene (90–95 vol%), garnet (5–10 vol%), and small amounts of olivine and accessory spinel. Contacts between the pyroxenite layers and serpentinized garnet peridotites are sharp, and no deformation or metasomatic textures occur along their boundaries. Garnet in pyroxenite has a slightly lower Mg content compared to that in peridotite, (Fig. 3). In clinopyroxenite, olivine occurs interstitially between clinopyroxene grains and as inclusions in garnet and clinopyroxene.

Garnetite with up to 98 vol% garnet and small amounts of apatite and clinopyroxene, locally altered to amphibole, occurs adjacent to garnet pyroxenite. In addition, magnesiotaramite and associated quartz and biotite occur as inclusions in garnet. Apatite contains exolution lamellae of monazite.

Eclogite at this locality is largely bimineralic, consisting of omphacite (Jd_{33}), garnet $Prp_{37}Grs_{16}Alm_{45}$), and accessory rutile, and symplectites of amphibole (diopside) + plagioclase.

P-T estimates were made for garnet peridotites using the Fe-Mg garnet-olivine exchange geothermometer (O'Neill and Wood, 1981), two two-pyroxene geothermometers (Tailor, 1998, Brey and Köhler, 1990), the Al-in-Opx and Cr-in-Cpx geobarometers (Brey and Köhler, 1990), and the spinel-garnet transition (O'Neill and Wood 1980). The results are approximately 4.0 GPa and 850–900 °C for garnet peridotite at stop 7-1 (Fig. 7) and 3.0 at 900 °C for stop 7-2 (not illustrated).



■ **Fig. 7.** Results of PT calculations for garnet peridotite at stop 7-1 (Faryad, 2009) obtained using different thermobarometers: BK90 – Brey and Kohler (1990), T98 – Taylor (1998), NT00 – Nimis and Taylor (2000), OW80 – O'Neill and Wood (1980) and O81 – O'Neill (1981).