# Eclogites from the Czech Part of the Erzgebirge

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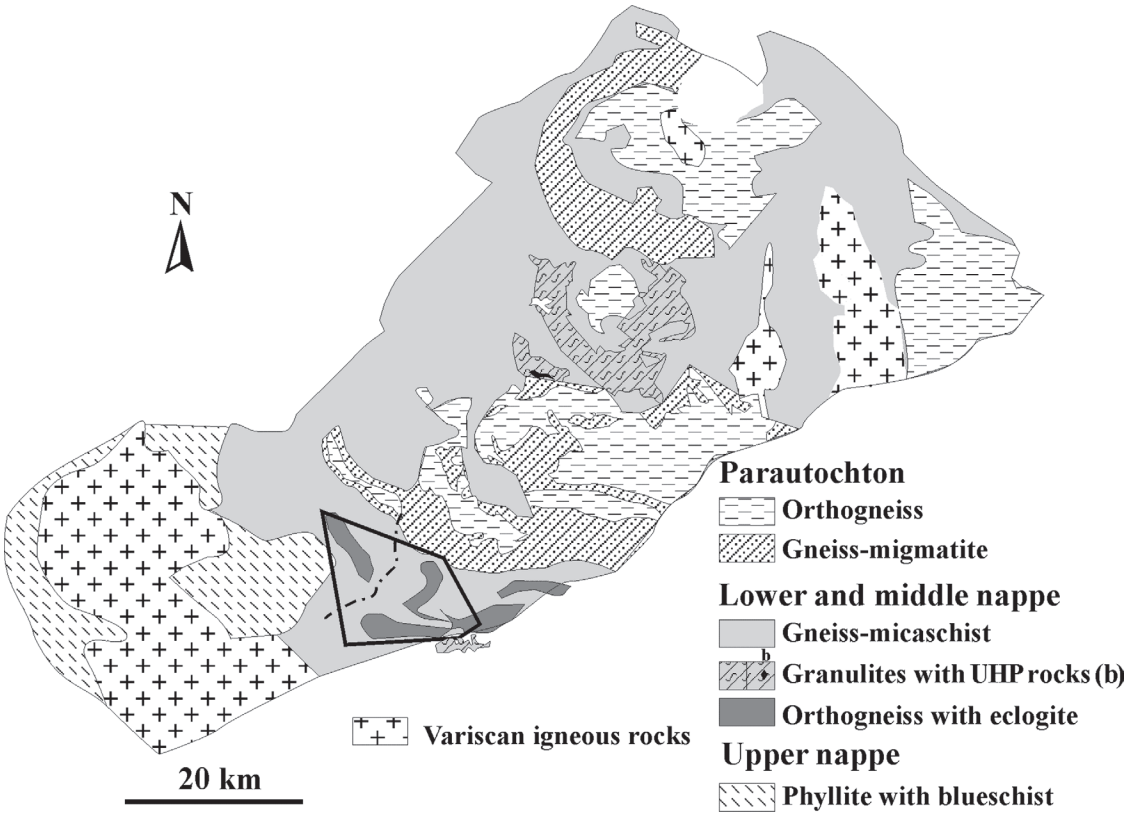
The Krušné Hory complex is formed by upper Proterozoic basement (the Saxothuringian parautochthon) and an overlying nappe stack (lower, middle, and upper nappes) with decreasing grade of metamorphism from bottom to top (Willner et al., 1997; Cháb et al., 2008). The parautochthon is exposed in several dome-like structures and consists of gneisses and migmatites with lenses of amphibolites. The St. Kateřina dome, in the Czech part of the Erzgebirge (Mlčoch and Schulmann, 1992), is formed by orthogneisses derived from an early Ordovician granite (Košler et al. 2004). They show medium-pressure amphibolite facies conditions with no signs of eclogite facies metamorphism (Konopásek, 1998).

The lower nappe is formed by gneisses with HP-UHP rocks (Schmädicke et al., 1992; Mingram, 1998; Rötzler et al., 1998; Willner et al., 1997; Gross 2008). In addition to coesite- and microdiamond-bearing gneisses, they contain lenses and boudins of eclogites and garnet and spinel peridotites. Age dating on zircon yielded 480 Ma for the igneous protholith of orthogneisses and 340 Ma for their metamorphism (Kröner and Willner, 1998; Massonne, 2007). Ages between 333 and 360 Ma for the thermal peak of metamorphism for HT eclogites and garnet peridotite were obtained from Sm-Nd mineral and whole-rock isochrons (Schmädicke et al., 1995).

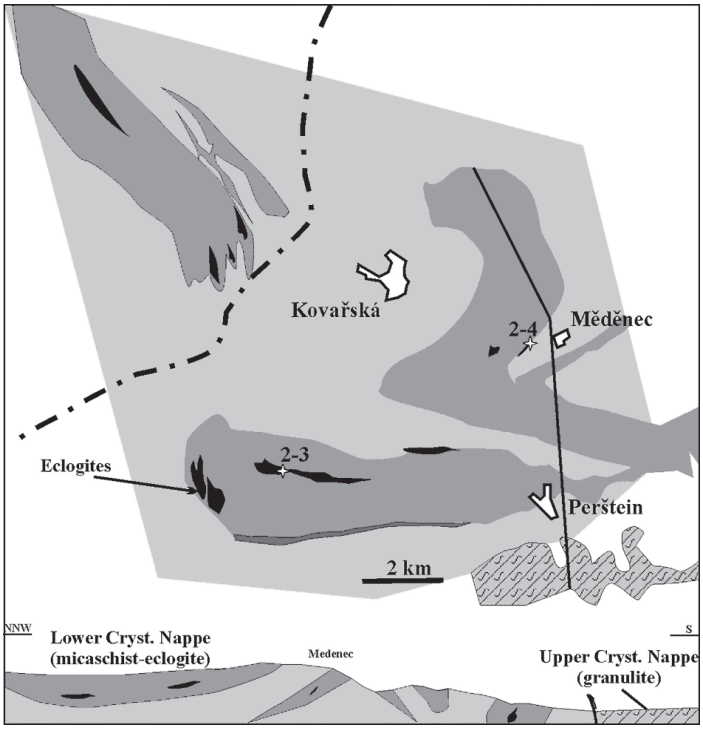
The middle nappe (Fig. 1) is represented by micaschists, gneisses, and lower Ordovician metarhyolite and metagranite (Mingram, 1998; Rötzler et al., 1998; Tichomirova et al., 2001). It contains lenses of eclogites, quartzites, and calc-silicate rocks. In the Czech part, orthogneisses with lenses of eclogites, quartzites and some calc-silicate rocks are present at the top of the middle nappe, above the micaschists. An early Ordovician protolith age for the orthogneisses was obtained by Košler et al. (2004). The micaschists also show HP-MT conditions (Konopásek, 1998; 2001).

The upper nappe is formed by lower-grade metasediments with volcanic material of Ordovician-Silurian age that are intruded by Variscan granite. The phyllitic rocks, which may contain garnet, are characterized by the presence of retrogressed blueschists, greenschists, quartzites, marbles, and calc-silicates. Relics of blueschist facies phases include crossite with epidote and albite (Holub and Souček, 1984).




■ **Fig. 1.** Simplified geological map of the Krušné Hory Mountains (Erzgebirge), after Cháb et al. ( 2008).

Alterrnatively, Konopásek et al. (2001) propose that metamorphic grade increases from bottom to top in the nappe stack. Based on the position of granulite at the Ohra River on the Czech side, they propose that the high-grade rocks over-lie the medium grade (lower crystalline nappe, Fig. 2), and the blueschist facies phyllites are interpreted as part of the parautochthonous unit.




■ **Fig. 2.** Geological map of the central part of the Krušné hory Mts.; eclogite occurrences shown in black (Klápová et al. 1998; Konopásek et al. 2001). Numbers 2-3 and 2-4 are locations of excursion stops.

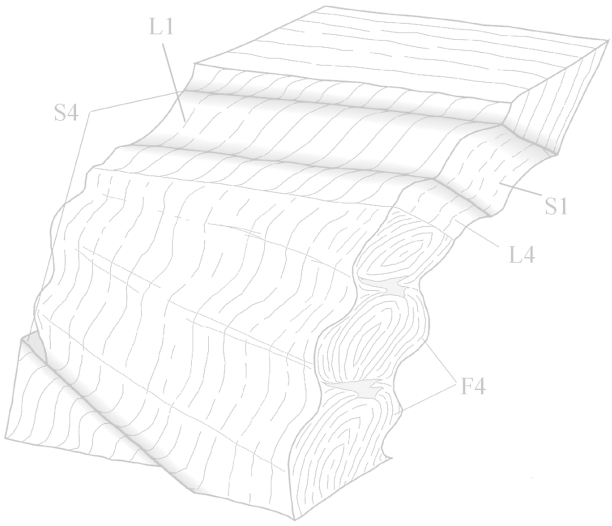
## Stop 2-3 (Day 2). Eclogite, Meluzína

Coordinate N50°23′25.3″ E13°00′21.9″

The Meluzína hill is a huge natural exposure of eclogite that forms an E–W elongated lens several kilometres in length and up to 250 m thick (Fig. 2). The strongly foliated, eclogite facies fabrics were formed by two deformation events, D1 and D2, which are both defined as syn-eclogitic (Klápová et al., 1998). In spite of two post-eclogitic deformations, D3 and D4, the eclogite is fresh and exhibits a well-developed foliation, S1, containing stretching and mineral lineations, L1 (Fig. 3). S1 is formed by the planar arrangement of platy minerals such as paragonite, phengite, and omphacite. A mineralogical layering characterised by alternations of garnet-rich and garnet-poor/omphacite-rich bands is also present. The late set (D3 and D4) of structures was developed under brittle-ductile conditions. These structures are represented mainly by asymmetrical intrafoliation boudinage, shear bands, and brittle cracks, which are filled by Qtz with Rt and Amp.

The eclogites have MORB composition (Klápová, 1990). U-Pb SHRIMP dating of 490 ±14 Ma on zircon and single-zircon U-Pb dating of 342.5 ±1.6 Ma are taken to be the ages of protolith and high-pressure metamorphism, respectively (von Quadt and Gebauer, 1998).

Based on their textures and mineral compositions, the Krušné hory eclogites can be subdivided into three types. The most frequent, dark-coloured, fine-grained type (type 1) has a layered structure, in which garnet-omphacite layers alternate with amphibole-rich layers. The garnet-omphacite layers may contain quartz, rarely also amphibole, paragonite, phengite, and epidote. Light-coloured, more coarse-grained eclogite (type 2) contains white lenses or discontinuous bands of epidote, several millimetres thick. It may also contain talc. Both types (1) and (2) show strong foliation, and there is a gradual transition between these two types. The last type (3) is unfoliated eclogite with a regular distribution of garnet and omphacite. It may contain eclogite facies carbonate minerals (Klápová, 1990).




■ **Fig. 3.** Three-dimensional sketch of planar and linear structures in mafic eclogites at the Meluzína locality, central Erzgebirge (Klápová et al. 1998).