

**SUPPLEMENT**

*Milosz HUBER*<sup>1</sup>

**MINERALOGICAL AND PETROGRAPHIC CHARACTERIZATION  
OF ECLOGITES FROM THE LAPLAND GRANULITE BELT  
(KOLA PENINSULA, NORTHERN RUSSIA)**

**INTRODUCTION**

In the northern and eastern parts of the Kola Peninsula, in the vicinity of Kandalaksha and in Salne Tundry region, respectively, the Archean complex is exposed called the Lapland Granulite Belt (Polkanov 1960). The complex originated presumably from the island arc volcanism forming a basement between the Belomoryan and the Kola blocks (2400-2700 Ma) (Kozlov 1990, 1991, 1995, 1998), and metamorphosed under the conditions of amphibolites facies (Kozlov 1990, 1991, Petrov & Belyayev 1996). Subsequently, the complex was intruded by gabbroids and again metamorphosed under the granulite and eclogite facies conditions (Bogatikov 1974, Petrov & Belyayev 1996). In the Upper Precambrian and Lower Paleozoic the disjunctive tectonics resulted in the formation of faults and blocks. This process was accompanied by the intrusions of granite and carbonatite veins, the latter with prehnite (Sorokhtin & Mitrofanov 1996, Huber 2001a,b).

The following paper presents mineralogical and petrographic characterization of eclogites exposed in the amphibolite complex from the Kandalaksha region. The specimens were studied under the reflected- and transmitted-light microscope. The X-ray powder patterns were obtained and the chemical composition was analyzed with the ICP and the MPA. The studies were run at the University of Mining and Metallurgy, and the Jagiellonian University in Krakow, as well as in the ACTLAB (Canada). Some information has also been collected during author's stay at the Russian Academy of Science, Kola Branch in Apatity.

**CHARACTERIZATION OF ECLOGITES EXPOSURES**

In Kandalaksha area the Lapland Granulite Belt is strongly tectonized. In the Kandalakshskiye Tundry Mts, 10 kilometers east from Kandalaksha (Huber 2001b), the three rock complexes occur: (1) the Louvyengskye Beds – amphibolite-biotite schists which are in contact with the rocks of the Belomoryan block, (2) the

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<sup>1</sup> *University of Mining and Metallurgy, Faculty of Geology, Geophysics and Environment Protection, 30-056 Kraków, al. Mickiewicza 30, Poland*

Kandalakshskye Beds (dominating in this area) – amphibolites and (3) the Plaskotundrovye Beds (exposed in the Zeleznaya Mt.) – several types of metamorphic rocks with garnets and feldspar. The exposure of eclogites (2 km<sup>2</sup>) is located on the northern slope of this mountain.

## RESULTS

The studied eclogites are reddish with greenish tint. The rock reveals massive structure. Mineralogical composition includes garnets (over 80 vol.%) with minor pyroxenes, amphiboles, and plagioclase. Under the microscope the eclogites show grano-nematoblastic structure. Alkaline plagioclase often forms a symplectite structure with pyroxene (originally in gabbro). Hornblende is a secondary product of pyroxene transformation during diaphoresis of eclogites. The garnets represent the pyrope group and contain 39% SiO<sub>2</sub>, 21% Al<sub>2</sub>O<sub>3</sub>, 0.1% Ti, 1% Mn, 6-10% Mg, 2-4% Ca (Kozlov 1998). Minor admixtures of quartz, Ti-magnetite, ilmenite and zircon were also observed. Chemical composition of eclogites includes: 37% SiO<sub>2</sub>, 18% Al<sub>2</sub>O<sub>3</sub>, 25,63% Fe, do 1% Ti, 8% CaO, 6% MgO. Applying the CIPW norms, the rock is a monzogabbro (guidelines Fe<sup>2+</sup>/Fe<sup>3+</sup> ≈0.8). On the basis of 3TiO<sub>2</sub>+K<sub>2</sub>O/SiO<sub>2</sub>+3CaO diagram the rocks can be localised at the continental edge.

## CONCLUSIONS

The studied eclogites are mafic rocks of gabbro type, metamorphosed under the conditions of amphibolite facies. Russian geologists distinguished the four stages of mafic intrusions. Basing upon the field observations, the author identified at least two types of such intrusions. Apart the eclogite rocks (first type) describe over, in the study area is recently the garnet-amphibolite gneiss formerly quartz monzonite (the second type). Considering the 3TiO<sub>2</sub>+K<sub>2</sub>O/SiO<sub>2</sub>+3CaO diagram (Kozlov 1990), these rocks seem to be close to the island-arc magmatism which may suggest the presence of intermediate stage of magmatic activity, preceding the intrusions of gabbroids (metamorphosed to eclogites). Currently these rocks are being intensively studied by the author.

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