

Varena suite in the crystalline crust of the Southern Lithuania: implication to the genesis and mineralization

Vaida Kirkliauskaite, Gediminas Motuza, and Raminta Skipityte
Vilnius University, Vilnius, Lithuania (vkirlys@gmail.com)

Keywords: Lithuania, Proterozoic, Varena suite, rare earth elements, metasomatism.

Crystalline crust in Southern Lithuania is covered by 200-500 m thick sedimentary cover and is investigated by potential field mapping and drilling. It is composed by amphibolites (metabasalts), biotite-quartz-plagioclase gneisses (metapsammites and porphyry metadacite and metaandesite) of Orosirian period. Each lithology is predominant in alternating bands extended NNE-SSW. Supracrustals are metamorphosed on the level of amphibolite facies and migmatized. Intrusive rocks are represented by coeval rare bodies of gabbro, peridotite and widespread Calymmian granitic plutons. Varena suite comprises olivine, enstatite, diopside, olivine-magnetite, magnetite, apatite-bearing, and presumably also dolomite rocks. They form integrated bodies few sq. km large, concentrated in the ~300 km² area extended in N-S direction. Bodies of particular rocks from Varena suite fixed in the boreholes are few tenths up to few hundred meters thick, except apatite-bearing rocks, forming decimeter up to meter scale lenses and veins.

Rocks of Varena suite are affected by strong metasomatic alteration. Olivine is substituted by serpentine, and phlogopite, pyroxenes with amphibols (hornblende, actinolite, tremolite, rarely richterite). The country rocks (amphibolites, metaporphyres) also affected by alkaline (mainly sodic) metasomatism manifested by formation of scapolite, albite, clinopyroxene (often sodic), phlogopite, carbonates. The mineralization of REE (up to 2759-3100 ppm of La and Ce respectively), Th, U, P hosted by monazite, apatite, allanite is spatially related to the Varena suite and some metasomatized supracrustals.

The views on the genesis of Varena suite are contradicting. By various authors they are regarded as skarns, presuming metasomatic origin, as layered intrusions or products of alkaline and carbonatitic magmatism.

In this presentation the genetic model is reviewed based on reinterpretation of structural, geochemical, petrographical data, and new isotopic studies of O, C, Sr in the rocks of Varena suite. According to preliminary data in carbonate rocks $\delta^{13}\text{C}_{PDB}$ ranges from -0.49 to +0.99 ‰ and $\delta^{18}\text{O}_{SMOW}$ - from +13,7 to +18,6 ‰ respectively. These values are compatible with Kola, Tamazert, Alnio carbonatites isotopic composition. $^{87}\text{Sr}/^{86}\text{Sr}$ in pyroxenic and carbonate rock is close to ones derived from mantle source. Isotopical data, imprints of K-Na metasomatism, favourable tectonic setting of the research area and age constraints shows similarities of this suite to fenitic areols inherent to alkaline and carbonatitic intrusions.