Geophysical Research Abstracts
Vol. 17, EGU2015-4111, 2015
EGU General Assembly 2015

Petrogenesis of Variscan lamproites of the Bohemian Massif

Lukáš Krmíček (1,2), Rolf L. Romer (3), and Johannes Glodny (3)

(1) Brno University of Technology, Faculty of Civil Engineering, Veveří 95, CZ-602 00 Brno, Czech Republic (l.krmicek@gmail.com), (2) Institute of Geology, v.v.i., Czech Academy of Sciences, Rozvojová 269, CZ-165 02 Prague, Czech Republic, (3) Deutsches GeoForschungsZentrum GFZ, Telegrafenberg, D-14473 Potsdam, Germany

Paleozoic convergence of Laurussia and Gondwana-derived terranes with subduction of oceanic and continental crust of various compositions metasomatized the local mantle, a process which eventually led to a highly heterogeneous lithospheric mantle beneath the European Variscides. The eastern termination of the European Variscides (Moldanubian and Saxo-Thuringian zones of the Bohemian Massif in the Czech Republic, Austria, Germany, and Poland) is unusual as within a small area, the mantle had been modified by material from several subduction zones. Along the eastern border of the Bohemian Massif, mantle-derived dyke intrusions of peralkaline, perpotassic, and ultrapotassic compositions occur. The rocks are distinguished by mineral associations with K-amphibole and Fe-microcline and correspond mineralogically to a new variety of silica-rich lamproites. Lamproites from the Moldanubian Zone contain characteristic Ba-Ti-Zr accessory minerals (e.g., baotite, benitoite, hollandite), whereas lamproites from the Saxo-Thuringian Zone lack these minerals. Variscan lamproites from the Bohemian Massif sampled lithospheric mantle, whose chemical signature reflects extreme depletion (low CaO and Al_2O_3 contents) followed by strong metasomatic enrichment by material released from the subducted rocks, giving rise to crust-like trace element pattern, variably radiogenic Sr and unradiogenic Nd isotopic compositions, crustal Pb isotopic compositions, and a wide range of δ^7Li ratios ranging from markedly positive to highly negative values. The metasomatic component is variably prominent in the lamproites, depending on the extent of partial melting, and the nature of the source of the metasomatic component. Preferential melting of the metasomatically enriched lithospheric mantle with stable K-amphibole resulted in lamproitic melts with very negative δ^7Li values, which correlate positively with the peralkalinity, HFSE contents, and lower εNd of these rocks. Both, higher degree of melting and consumption of the metasomatic component reduce the chemical and isotopic impact of the metasomatic contribution to the lamproites. The very positive δ^7Li values of some lamproites together with the depleted geochemical signature of the whole rocks indicate that subducted altered oceanic crust also may have modified the source of these lamproites.