Oligocene shoshonitic rocks of the Rogozna Mts. (Central Balkan Peninsula): evidence of petrogenetic links to the formation of Pb-Zn-Ag ore deposits

Borojević Šoštarić[1], S., Cvetković[2], V., Neubauer[3], F., Palinkaš[4], LA., Bernroider[2], M., Genser[2], J.

[1] Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb, Pierottijeva 6, HR-10000 Zagreb, e-mail: sibila.borojevic-sostaric@rgn.hr; phone: +385-1-4605 800; fax: +385-1- 4836 057
[2] Faculty of Mining and Geology, University of Belgrade, SR-11000 Belgrade, Serbia
[3] Department Geography and Geology, University of Salzburg, A-5020 Salzburg, Austria
[4] Faculty of Science, University of Zagreb, Horvatovac 95, HR-10000 Zagreb

Abstract

The study focuses on age and evolution of the Oligocene quartzlatite of the Rogozna Mts. (Central Balkan Peninsula), in order to better understand the link between magmatism and formation of Pb-Zn±Ag mineralization. New Ar/Ar biotite and amphibole plateau ages suggest that Rogozna Mts. quartzlatite originated through a continuous volcanic episode from 27.3±0.1 to 29.5±0.1 Ma which was immediately followed by a hydrothermal phase. The quartzlatites are hypocrystalline porphyritic with phenocrysts and microphenocrysts (~60 %vol.) of plagioclase (An_{37-49}), biotite Mg# [100 × Mg/(Mg + Fe_{tot})]<50, calcic amphibole, quartz, sanidine clinopyroxene and phlogopite (Mg#=79 to 84). The rocks display numerous disequilibrium textures, such as: sieved plagioclase phenocrysts, dissolution effects on quartz, phlogopitized biotite and amphibole crystals, and phlogopite microphenocrysts showing effects of incomplete growth (or dissolution?) and biotitization. The Rogozna Mts. quartzlatites are shoshonitic in character having Na_2O/K_2O<1, high LILE/HFSE ratios, strong depletions at Nb and Ti and K, Pb and U peaks on primitive mantle-normalized diagrams. They are similar to other potassic/ultrapotassic rocks in this region, in particular to those of Veliki Majdan and Rudnik (West Serbia), which are also related to Pb-Zn deposits. The evolution of the Rogozna Mts. quartzlatite is modeled using a trace element binary mixing model adopting a lamproite magma and a dacite-like calc-alkaline melt as end-members. The model implies that a fractionating magma chamber (~4.5–9.5 km) undergoes cooling in the range >860ºC- ~720ºC and injection of lamproite-like melts. The injection causes increase of temperature and decrease of viscosity of the resulting hybrid magma facilitating its upwelling and triggering pyroclastic eruptions. Addition of new volatiles by lamproitic melts most probably established conditions for hydrothermal phase above the magma chamber that was

previously degassed explosively. This implies that magma mixing processes can be of great importance for the formation of Pb-Zn deposits. Similar processes are likely to have occurred in other areas with economically significant Pb-Zn-Ag±other metals mineralization in the region of Central Balkan Peninsula (Veliki Majdan, Rudnik, Golija, Kopaonik, Avala, etc.).