Geophysical Research Abstracts
Vol. 16, EGU2014-3809, 2014
EGU General Assembly 2014

A geochemical and petrological study of the Late Cretaceous banatites from the Apuseni Mountains, Romania

Jacqueline Vander Auwera (1), Tudor Berza (2), Alain Dupont (1), Julie Gesels (1), and Christian Pin (3)

(1) University of Liège, Geology, Liège, Belgium (jvdauwera@ulg.ac.be), (2) Geological Institute of Romania, (3) Geology Department, Blaise Pascal University

Banatites from western Romania belong to the more than 1000 km long and 30 to 70 km wide Late Cretaceous magmatic belt that spreads across southeastern Europe (Apuseni-Banat-Timok-Srednogorie). These banatites (Apuseni Mts. in the north and Banat in the south) occupy a particularly important area as they were emplaced across a major boundary between the Tisza and Dacia mega-units. Given their calc-alkaline signature and depletion in HFSE, they are interpreted as subduction related. Mineralogical, geochemical and isotopic (Sr, Nd) data were acquired on a series of samples from a selection of intrusions of the Apuseni Mountains in order to model their possible differentiation processes and to compare them with published results on banatites from Banat and Serbia (Timok and Ridanj-Krepolijn).

Samples from the Apuseni Mts. display high-K calc-alkaline differentiation trends of decreasing FeOt, MgO, CaO, P2O5, TiO_2, Sr, Zn, Co, V and increasing Rb and Th with increasing SiO_2 (54.4 wt. % to 72 wt. %). Mixing is a plausible differentiation process as mingling relationships have been observed between microdiorites and granodiorites in Pietroasa but is not supported by geochemical data. These are better predicted by fractional crystallization but phenocrysts unmixing cannot be precluded. The fractional crystallization process has been modelled in three steps using the least square regression method : a gabbronoritic cumulate is subtracted in the first step whereas apatite-bearing dioritic cumulates are subtracted in the two later steps with a more albitic plagioclase in the third cumulate. The trace elements composition of the samples support the proposed model. The composition of the least differentiated samples collected in the Apuseni Mts. preclude them as being primary magmas in equilibrium with a mantle source. We however suggest that these least differentiated compositions were derived by limited differentiation of a mantle-derived magma that either was trapped in the lower crust because of its high density or was not sampled because of poor exposure in the Apuseni Mts.

The major and trace elements composition of the Apuseni banatites is very similar to that of banatites from Banat but the two sets of samples display strikingly different isotopic compositions. In an epsilon Ndt versus Sri diagram, three groups are observed. One group made of some of the Banat samples plots close to the mantle array and the composition of the enriched mantle. A second group, comprising most of the banatites from Banat has mildly positive epsilon Nd and clusters around a Sri of 0.705. The third group comprises most of the Apuseni samples and display negative epsilon Nd and high Sri. It is possible that the first group broadly witnesses the isotopic composition of the enriched mantle source whereas the other two groups evidence crustal contamination. Moreover, we suggest that two different crustal contaminants were involved in Banat and Apuseni in agreement with their emplacement in two different mega-units. This hypothesis is corroborated by published data on banatites from Serbia.