

REE investigation of the Motru Dyke System components from the Danubian basements (South Carpathians, Romania)

Mara Campeanu (1), Constantin Balica (1), Ioan Balintoni (1), Claudiu Tănăselia (2), and Oana Cadar (2)

(1) Babes-Bolyai, Geology, Cluj-Napoca, Romania (mara.campeanu@gmail.com), (2) INCDO-INOE 2000 Research Institute for Analytical Instrumentation ICIA, Cluj-Napoca, Romania.

Dragsan and Lainici-Paius groups represent the basement components of the Danubian Alpine units (South Carpathians, Romania), which consist of medium-grade metamorphic rocks. A subvolcanic system of dykes (i.e. Motru Dyke System - MDS) crosscut mostly the Lainici Paius basement as an effect of a late-Variscan thermo-tectonic event.

The geochemical features, frame the MDS components within a wide range of petrotypes (basaltic andesites to rhyolites), and define a wide differentiation series. Classically this subvolcanic system was inferred to be in connection to a unique mantle source [1], however, recent studies [2,3] suggest a mixed mantle-crust source, based on the interpretation of the trace elements in conjunction with Sr and Nd isotope data. Additionally, the presence of relict zircon grains consolidates this assumption.

New REE data collected from eight MDS components, generally confirm the mixed mantle-crust source hypothesis. The distribution patterns reveal two groups of samples. The first group (six samples) is moderately enriched in REE and shows moderately fractionated patterns with (La/Yb)_N between 7-21 and low Eu/Eu* (0.81-0.9). The second group, strongly enriched in light REE, have high (La/Yb)_N and strong negative Eu anomaly (Eu/Eu* of 0.41 and 0.38 respectively). [U+Th] REE vary between 107-147 ppm for the first group and 612 ppm - 907ppm for the second group. We can assume a stronger fractionation of plagioclase as well as of garnet and amphibole for the second group. With a flatter pattern, for the first group of samples, the fractionation of these minerals appears to be moderate.

The emplacement age of MDS has been long disputed, since it was supposed as pre-Silurian for a long time. However, newly zircon U/Pb isotopic dating performed on two collected samples indicate a mean age of ~300 My [2,3].

Owing to the crosscutting relationships with the post-collisional granitoid plutons emplaced in the Danubian basement during the late Variscan, and based on new geochemical data, we consider that MDS was generated from a mixed mantle and crustal source, and emplaced in a post-collisional tectonic setting during the final stages of the Variscan orogeny.

Acknowledgements: study supported by PN-II-ID-PCE-2011-3-0100 Grant, UEFIS-CDI and Core Program - ANCS PN 16.40.02.01.

References:

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