Geochemistry of the Salma eclogites (Belomorian mobile belt, Baltic Shield)

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In the north-western part of the Belomorian mobile belt were found numerous bodies of an eclogitic rocks, which were named Salma eclogites [1]. Salma eclogites include two types of eclogitic rocks (after basic and after ultrabasic rocks) which occur as tectonic blocks of various size and shape in gneisses. Sm-Nd (grt-cpx-wr) and a local zircon U-Pb dating give the eclogites ages of 1.9 Ga [2]. The data have not proved previously published the Archean values of eclogite metamorphism age. The eclogites are variably affected by overprinted amphibolization. So, rims of Salma eclogite bodies are commonly strongly amphibolized and also some bodies are completely replaced by amphibolites. Geochemistry of REE and trace elements in the eclogites and garnet amphibolites (completely retrogressed eclogites) were investigated using ICP-MS. Both basic and ultrabasic less retrograded eclogitic rocks have an almost flat chondrite-normalised REE patterns (YbN/LaN – 1,15-1,96) (Fig. 1). Retrogressed Salma eclogites and garnet amphibolites after eclogites in comparison with fresh rocks are enriched in REE (especially in LREE) and trace elements (U, Th, Nb, Ti, Zr). The enrichment in REE and high field strength elements is caused by fluid affection during retrograde metamorphism.

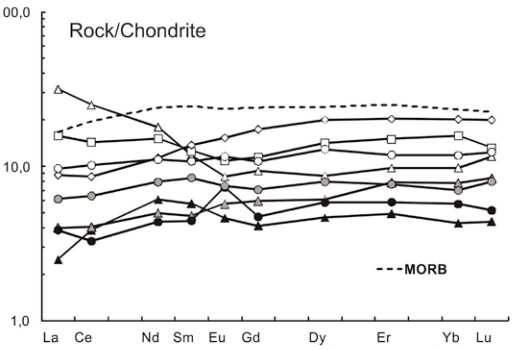

Figure 1: REE distribution in Salma eclogites (solid symbols - ultrabasic eclogites; gray symbols - basic eclogites; open symbols - retrogressed eclogites and garnet amphibolites after eclogites).

[1] Konilov *et al*. (2004) 32nd IGC Abstracts (pt. 1) 108.
[2] Skublov, Berezin, Melnik (2011) Petrology 19, 470-495.

Geochemical characteristics of volcanic and plutonic rocks in the 36 Ma Organ Mountains caldera, USA: Are they telling the same story?

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Volcanic and plutonic rocks are often studied as separate magma systems as they naturally represent different crustal depth levels. Results from such studies have often led to inconsistent interpretations regarding the geochemical processes and the time scales responsible for the compositional variations. This has resulted in a blurred understanding of the connection between these two sub-systems and how magma plumbing systems operate over time.

We are examining the ~36 Ma Organ Moutains caldera in New Mexico, USA, where contemporaneous volcanic and plutonic rocks of the same arc magma system are juxtaposed due to extensional tectonics along the Rio Grande Rift. Detailed geologic and structural mapping [1] and high precision $^{40}Ar/^{39}Ar$ ages of both volcanic and plutonic rocks [2] provide an excellent framework to study the geochemical evolution and connection of both rock types for >2.5 myrs of active magmatism. Three caldera-forming ignimbrites erupted within 600 kyrs [2] from this system with a total erupted volume of 500-1,000 km^3 next to less voluminous pre- and postcaldera trachyte and andesite lavas. The ignimbrite sequence is zoned from a crystal-poor, high-SiO_2 rhyolite at the base to a crystal-rich, low-SiO_2 rhyolite at the top. This compositional zoning pattern of increased silica is also seen from the top downward in the main intrusion, the Organ Needle batholith, which has been interpreted to be the source for the ignimbrites [1]. The plutons are composed of granodiorite and syenite, and minor diorite and leucogranite.

We will present major oxide, trace element and Sr, Nd and Pb isotope analyses of whole rocks for all plutonic and volcanic units as well as CL images and electron microprobe analyses on individual minerals and discuss 1) the geochemical relationship at rock and mineral scales of all rocks including pre- and postcaldera forming units, 2) the magmatic process(es) responsible for the compositional variations in both rock types, and 3) the possible cause(s) for the large ignimbrite eruptions as well as the smaller sized lava flows if they were derived from the underlying intrusions.

[1] Seager (1980), NM Bureau of Mines and Min. Res. Memoir 36, 97 p. [2] Zimmerer & McIntosh (2013) Journal of Geophysical Research, v. 93, p. 4421–4433

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