GENESIS OF MIASKITES IN THE VISHNEVYE GORY MASSIF: CONSTRAINTS FROM REE GEOCHEMISTRY

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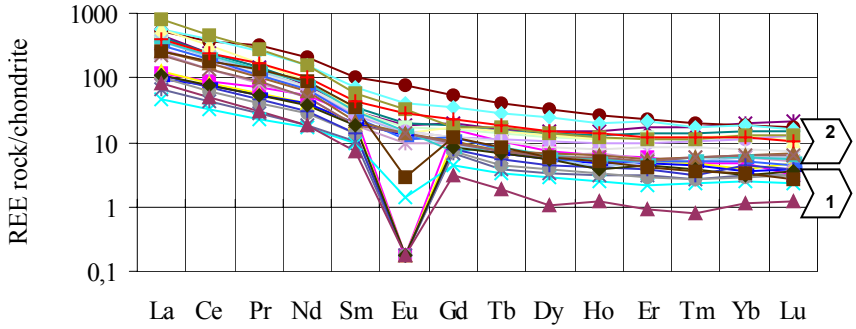
The distribution of REE in miaskites from the Vishnevye Gory Massif highlights principal differences between these rocks in the massif roots (autochthonous bodies and migmatites) and its apical parts (allochthonous miaskites). For example, the autochthonous miaskites are low in REE (ΣREE = 100-300 ppm) and have no Eu minimum.



Chondrite-normalized REE patterns for the Vishnevye Gory miaskites, 1-autochtonous miaskite, 2-allochtonous miaskites

The low REE concentrations in the autochthonous miaskites suggest that the processes of miaskitization in the lower crust were induced by fluid flows alone, and there was no magmatic source. This follows from the fact that fluids cannot transport any significant REE amounts over a broad pressure interval [1], because of which the REE geochemistry of the miskites was controlled by the geochemistry of the fenitized gneisses from which the miaskitic magmas were derived. A noteworthy feature of the REE geochemistry in the autochthonous miaskites is the presence of an Eu minimum, whose appearance in the process of fluid-magma-rock interaction suggests that the miaskitization proceeded via fluid filtration through the rocks and newly formed magmas, i.e., this process can be described within the framework of the magmatic replacement model. This conclusion follows from the modeling of REE behavior in a magmatic replacement column [2] and in the process of metamagmatism [3], when fluid filtration trough magma results in Eu redistribution into this fluid from the magmas.

The study of the REE geochemistry in miaskites from the Vishnevye Gory Massif led us to conclude that the miaskitization processes in lower crustal environments were induced by fluid flows from deeper levels, while REE enrichment in the allochthonous miaskites was a consequence of miaskite magma differentiation in the apical parts of the chamber. This research was financially supported by the Russian Foundation for Basic Research, project no. 02-05-64904 and a RAS grant for young researchers (no. 311).

References:

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