The Lupveem Uplift: REE Distribution in Rocks

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The Lupveem uplift is located 100 km north of Bilibino in the Chukotka Region, Russia. Rock samples represent trias gabbros and cretaceous intermediate to felsic rocks of the Lupveem batholith and dykes. We ran XRF analysis for major elements and ICP-MS for REE.

The analyzed rocks belong to mafic (gabbro of the Anyui complex), intermediate (dyke and lamprophyres) and felsic groups. Most of the rocks are calc-alkaline, except the Anyui gabbro that falls into tholeiitic series. Alkaline rocks are predominant among the felsic petrotype.

There are three types of REE patterns of rocks (fig. 1) normalized to chondrite REE abundance [1]. (1) Gabbro displays the slightest enrichment of LREE with respect to HREE (La_N/Lu_N = 2.8) and no Eu anomaly. (2) REE patterns of lamprophyres and dyke demonstrate contrast fractionation (La_N/Lu_N = 31 and 16 respectively) and weak negative Eu anomaly (Eu_N/Eu^* = 0.8). (3) Felsic rocks are characterized by the clear enrichment of LREE (La_N/Lu_N = 6 to 39, depending on the silica content) and moderate negative Eu anomaly (Eu_N/Eu^* = 0.4).

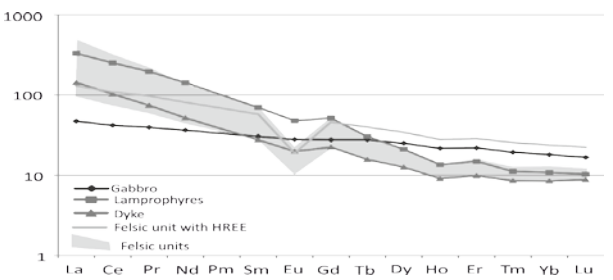

Figure 1: Normalized REE patterns of the Lupveem rocks.

The occuring of negative Eu anomaly indicates changing redox conditions over crystallization history which is favorable for the formation of post-magmatic deposits. Only the Anyui diorite sills were formed in extensional regime while other rocks intruded in compressional conditions typical of subduction and orogenic settings.

[1] Anders & Grevesse (1989) Geochim. Cosmochim. Acta, 53, 197-214.