The highly precise methods allowing to analyze rare elements and REE in minerals, such as INAA, SIMS, PIXE, LA-ICP-MS, give a new possibilities to study petrology of polymetamorphic complexes. A common presence of amphiboles in rocks from the green-schist facies to the granulite facies makes these minerals attractive for the reconstruction of metamorphic sequences and character. Nevertheless, an application of amphiboles in the petrological modeling is very confined because of their mineralogical and crystal chemical complexity. The known amphibole-bearing mineral thermometers and barometers are empirical and often are not consistent with calculated thermodynamic data. Calcic amphiboles are characterized by high concentration of REE. In addition, a number of investigators showed that REE and rare elements were able to accommodate in different sites in amphiboles. That explains their different mobility and unambiguous behavior in petrological processes [1]. Until now, distribution of REE in metamorphic calcic amphiboles was not studied. The mostly investigated amphiboles are those of magmatic rocks and eclogites. There are just rare determinations of REE in amphiboles of the granulite facies [2], whereas data on amphiboles from amphibolites are practically absent. The present study is based on the analysis of REE distribution in amphiboles from the polymetamorphic Nyurundukanskii Complex (N-W Cis-Baikalie). The REE concentrations were measured by the INAA method in the Institute of Precambrian Geology and Geochronology RAS and ion microprobe (SIMS) in IMI RAS.
matic amphibole strongly differs from amphiboles of main metamorphic stages. It is similar to the REE curve of co-existing garnet with a distinct Eu-anomaly and an increase from average REE to HREE (Fig. 2). No doubt, that such distribution is inherited from garnet. Similar inheritance of REE distribution from garnet and clinopyroxene was observed in study of the imposed metamorphism in eclogites and metamorphosed oceanic gabbro [7]. An analyses of such relationships gives a possibility to establish a sequence of mineral formation.

References: