Mantle sources of Archean gabbroanorthosite of the Fennoscandian Shield: isotopic study of U-Pb in zircon and isotope-geochemistry data

N. KUDRYASHOV[1], A. MOKRUSHIN[1] AND S. SKUBLOV[2,3]

[1]GI KSC RAS, Apatity, Russia
[1]nik@geoksc.apatity.ru
[2]IPGG RAS, St. Petersburg
[2,3]skublov@yandex.ru
[3]SPMI, St. Petersburg

Archaean gabbroanorthosite magmatism is located in the north-eastern part of the Fennoscandian Shield and is presented by Neoarchean (2.7-2.6 Ga) [1] and Mesoarchean intrusions (2.9 Ga).

The Mesoarchean gabbroanorthosite intrusions are similar to the anorthosites of the Fiskenesset Complex (Greenland), the Karnataka craton (India) and the Vermillion Lake Complex (Canada). U–Pb zircon dating established Mesoarchean ages of 2925±7 and 2935±8 Ma for the gabbroanorthosites of the Patchemvarek and Severny intrusions, respectively. Zircon has typical igneous REE patterns and oscillatory zoning. The normalized pattern is characterized by a steeply-rising slope from the LREE to the HREE with a positive Ce-anomaly and negative Eu-anomaly.

It was shown that the gabbroanorthosite have fairly low REE contents (Ce_n = 2.2–4.2, Yb_n = 1.6–2.6) and distinct positive Eu anomaly. Comagmatic ultrabasic differentiates have practically unfractionated REE pattern, low total REE contents (Ce_n = 1.2, Yb_n = 1.1, La/Yb_n = 1.32), and have not Eu anomaly. The Mesoarchean gabbroanorthosites are characterized by positive ε_{Nd}= +2.77 - +1.66 and Neoarchean gabbroanorthosites - ε_{Nd}= +1.78 - +0.26. The Sm-Nd isotope data suggest the existence of several mantle sources in the NE Fennoscandian Shield, which produced melts for different-age gabbroanorthosite.

The Mesoarchean gabbroanorthosites were presumably derived from MORB-type basalts of oceanic settings, while the Neoarchean gabbroanorthosites were generated from subalkaline magma formed within plate anorogenic setting.

The research is supported by RFBR-14-05-92693.

[1] Bayanova T.B. Vozrast repernykh geologicheskikh kompleksov Kol'skogo regiona i dlitel'nost' protsessov magmatizma (Age of Reference Geological Complexes of the Kola Region and Duration of Magmatic Processes), St. Petersburg: Nauka, 2004.