5.7.P02

Isotope Sm-Nd mineral and WR dating of the Archaean Kanozero alkaline massif (N-E Baltic Shield)

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Kanozero massif is situated in Belomorian domain of N-E Baltic Shield and earlier was Proterozoic age. Kanozero massif rocks include alkaline granites and pegmatites with amazonite; country rocks are represented by garnet amphibolites with TTG [1].The aim of investigations was geology-geochronology studying for rocks and minerals of the Kanozero alkaline massif.

After thin-section petrological study from alkaline granite for Sm-Nd and U-Pb isotope investigations rock-forming and accessory minerals were separated. All chemical Sm-Nd procedures were according to [2]. Isotope measurements were carried on the mass-spectrometer Finnigan MAT-262 (RPQ); blank of Sm 200 pg and Nd 300 pg. Sm-Nd isochrone on biotite, titanite and WR has shown age 1921 ± 53 Ma (MSWD=0.59), which was interpreted as time of metamorphic Svecofennian event. Model Sm-Nd WR age of Kanozero alkaline granite is about 2.84 Ga and εNd =-3.5 shows the similar features with alkaline granites of the Baltic Shield. Conventional U-Pb age on zircon from Kanozero massif gave Archaean magmatic age 2667 ± 36 Ma [3].

Archaean alkaline rocks are widespread in the world [4]. Alkaline rocks including carbonatites, alkaline granites and syenites, lamprophyre dikes and sanukitoids occurs in the N-E Baltic Shield. New U-Pb ages on zircon from alkaline Zapadnokeivy, Ponoy, Belaya Tundra granites and Sakharjok alkaline and nepheline syenites located in Keivy terrane (N-E Baltic Shield) gave interval of rocks forming from 2.75 to 2.61 Ga. The coevals U-Pb zircon-baddeleyite ages have been obtained for Siilinjarvi carbonatites (Finland): 2613 ± 18 Ma and 2611 ± 10 Ma.

All Archaean alkaline rocks of the Baltic Shield have common geochemical and isotopic characteristics: model Sm-Nd ages about 2.9-2.8 Ga, negative value εNd (to -4), increased light REE with Eu-minimum. On the diagram εNd-εSr alkaline rocks of the Baltic Shield falls in the field of enriched EM1 mantle source [5].

New model Sm-Nd WR (2.84 Ga), negative εNd (-3.5) and U-Pb zircon isotope data enlarged scale of the Archaean alkaline magmatism in the N-E Baltic Shield.

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5.7.P03

Trace-element and Nd isotope studies of the Archaean anorthosites from the Fennoscandian shield

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A distinctive suite of the Archaean massif-type anorthosites is known from the Kola Domain in the NE Fennoscandian shield. Two age groups of the Archaean anorthosite complexes have been distinguished. The oldest Kolmozero complex (formation age is of ca. 2920 Ma) is represented by the small sheet-like bodies of 2 km thickness and composed mainly of gabbro-anorthosite and of endocontact pyroxenite and gabbro. The complex is spatially confined to Kolmozero-Voronja greenstone belt, marking their initiation stage. The Kolmozero anorthosites have extremely low REE abundances (Ce about 2.2-4.2, Yb about 1.6-2.6 times chondrites) and show the primitive REE distribution (low chondrite-normalized La/Yb of 1.6-2.6) and distinct positive Eu anomalies (Eu/Eu*=1.97-2.24). The $\varepsilon_{Nd}(T)$ value for anorthosite is of +0.53. It is suggested that the primary magma for the Kolmozero anorthosite is of MORB-like type, forming during the early development of the Late Archaean greenstone belt. The Keivy anorthosite complex of 2660-2680 Ma formation age [1] consists from the large (up to the 130 km^2) lopoliths, composed mainly of anorthosites and gabbro-anorthosites, and of marginal gabbro-norite and titanomagnetite-rich olivinite and troctolite. The massifs are spatially and temporally associated to Keivy peralkaline granite anorogenic complex of 2650-2670 Ma age [2]. The Keivy anorthosites have low and moderate REE abundances (Ce about 5-23, Yb about 1.5-6.8 times chondrites), show the highly fractionated REE distribution (the chondrite-normalized La/Yb values are of 4-10) and distinct positive Eu anomalies (Eu/Eu*=1.8-3.1). The comagmatic gabbro-norites have the similar REE patterns, but no or negligible positive Eu anomalies. As the chondrite-normalized La/Yb values do not correlate to REE abundances, the enriched source for primary magmas is proposed. The enriched source for Keivy anorthosites is enhanced by low $\varepsilon_{Nd}(T)$ ranging from -0.15 to -0.24, and low Y/Nb values (0.6-1.3). From the geological and geochemical data the subalkaline (alkaline?) basalt magma is inferred as the primary one for Keivy anorthosite, forming in within-plate setting.

References

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