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Nd-Sr evidence of Palaeoproterozoic Cu-Ni-Co-PGE-magmatism in Fennoscandia and mantle-crust interaction on stages of layered intrusions formation

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Palaeoproterozoic Fennoscandian layered intrusions belong to the pyroxenite-gabbronorite-anorthosite formation and spread on a vast area within the Baltic Shield. Based on isotope U-Pb, Sm-Nd, Rb-Sr and Re-Os data the duration of this formation can be to 100-130 Ma (2.53-2.40 Ga) [Serov et. al., 2008; Bayanova et. al., 2009].
We have studied rocks of layered PGE-bearing Fedorovo-Pansky, Monchetundra, Burakovsky, Olanga group intrusions and Penikat intrusion. According to recent and new complex Nd-Sr-REE data magma source of the vast majority of these intrusions was a mantle reservoir with unusual characteristics: negative values of εNd (from 0 to -4) and ISr = 0.702-0.706, flat spectra of REE (value of (La/Yb)N $\sim$ 1.0-5.8) with positive Eu-anomalies [Bayanova et. al., 2009; Bayanova et. al., 2014].
However, the distribution of REE for ore-bearing gabbronorite intrusions Penikat (Sm-Nd age is 2426 $\pm$ 38 Ma [Ekimova et. al., 2011]) has a negative Eu-anomalies. This may be due to the formation of plagioclase and its removal from the magma chamber.
One of the aims of isotope geochemical investigations is to establish the contribution of mantle components in the formation of layered intrusions rocks and the degrees of contamination of the magma source by crustal material. To calculate the proportion of mantle component model binary mixture was used [Jahn et. al., 2000]. As the mantle components we used data for CHUR: εNd = 0, [Nd] = 1.324 [Palm, O'Neil, 2003] and for crustal components were used host-rocks Nd-data.
The proportion of mantle component for the studied intrusions was 77-99%. Also, data were obtained for the Monchetundra dike complex and amphibolized gabbro, for which the proportion of mantle material was 20-40%. For these rocks a significant crustal contamination is most likely. This process resulted in low values of εNd, a direct relationship between εNd and Nd concentration, and significant differences between the U-Pb and Sm-Nd model ages. A characteristic feature is that in most cases, the proportion of mantle component decreases from the central parts of intrusions to their boundary zones. This may indicate a slight degree of contamination of the magma intrusion by crustal material near the contacts with the frame- rocks.
Thus, our investigations show that Palaeoproterozoic layered PGE-bearing intrusions in the N-E Fennoscandian Shield were derived from intraplate magmatism. The same Palaeoproterozoic layered intrusions are known on the Fennoscandian Shield, Superior and Wyoming provinces of the world, and according to [Heaman, 1997; Ernst et.al., 2008] they were derived from the mantle plumes which caused the breakup of the oldest Kenorland supercontinent.
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