Pb, Nd, Sr isotopic composition of the Mesoproterozoic mafic intrusions (Udzha paleorift, Northern Siberia)

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Geodynamic reconstructions are largely based on information contained in mafic igneous rocks, including dykes and sills. The age and isotope-geochemical characteristics of such rocks are inevitable for understanding of geodynamic history of the Proterozoic cratons. The regions in Siberian Craton, where Precambrian mafic dyke swarms are known are following: Anabar Shield and Olenek Uplifts, Aldan-Stanovoi Shield, SE area of Siberian Craton, and smaller Uplifts on the SW margin of Siberian Craton.

The Udzha paleo-rift is located in the northern part of Siberian Craton between Anabar and Olenek Uplifts is also associated with mafic dyke swarm. These dykes cross-cut the pre-Neoproterozoic sedimentary successions. The age of the largest dyke in Udzha paleo-rift (Great Udzha Dyke) presented by medium-grained dolerite was determined to be 1386 ± 30 Ma (Malyshev et al., 2018).

We present new data of Sr, Nd and Pb isotopic composition on the Udzha paleo-rift dykes, determined by TIMS. The initial isotopic composition of Pb in the dykes was obtained using the leaching method by Savatenkov et al., 2019. The Sr isotopic composition of the dykes demonstrates substantial variation (εSr varies from 8.4 to 110.4). We do not consider this fact as a result of crust contamination, because Nd isotopic composition does not vary significantly (εNd varies from -1.4 to 0.7). Obtained results indicate that initial for the Udzha paleo-rift dykes melts were generated from two mantle reservoirs of DM and EMII-type. The initial Pb isotopic composition of the dykes reveals EMII source participation in the melts generation too (²⁰⁶Pb/²⁰⁴Pb varies from 16.133 to 16.266, ²⁰⁷Pb/²⁰⁴Pb varies from 15.343 to 15.458). The presence of enriched component is likely associated with lithospheric mantle, metasomatized by fluids, derived from subducted terrigenous material.

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References