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New geochronological limits for paleomagnetic data from Precambrian Ners dykes of the Siberian craton

Elena Vasyukova (1,2) and Dmitry Metelkin (1,3)

(1) Novosibirsk State University, Department of Geology and Geophysics, Novosibirsk, Russian Federation (metelkindv@ipgg.sbras.ru), (2) Sobolev Institute of Geology and Mineralogy SB RAS, Novosibirsk, Russian Federation, (3) Trofimuk Institute of Geology and Geophysics SB RAS, Novosibirsk, Russian Federation

On the southwestern margin of the Siberian craton, dykes and sills of gabbro-dolerites are widely distributed, combined into the Ners complex. The most famous occurrence is in the middle reaches of the Biryusa River. Their petrochemical characteristics and structural position resemble the typical dyke swarms of the Franklin complex in the north of the Canadian shield. The results of the first Ar-Ar studies of the complex have shown that the main stage of their intrusion corresponds to the boundary of ∼740 million years, which is really very close to the magmatic event Franklin - 720 million years ago. The obtained paleomagnetic data confirmed the possibility of combining these complexes as a single magmatic area formed during the decay of the Rodinia supercontinent, and the paleomagnetic pole itself became the key to the average Neoproterozoic of Siberia. Somewhat later, single younger datings (about 610 and 510 million) were obtained, although they did not find the difference in the question of the possibility of separating the Ners complex, but they do not contradict other regional geological data. However, according to the results of U-Pb dating of baddeleyite, one of the largest and studied paleomagnetic methods of intrusion was a more ancient age ∼ 1.6 billion years [Ernst et al., 2016]. To verify the obtained U-Pb data, we carried out Sm-Nd isotopic studies.

The investigated rocks are full-crystalline dolerites with a poikilitic, ophytic structure. The main rock-forming minerals are the plagioclase laths composing the skeleton of the rock, and the larger xenomorphic oicocrysts of clinopyroxene. Clinopyroxene is brownish in color, has a high content of titanium. On the edge, clinopyroxene is successively replaced by amphibole, biotite and chlorite.

For no sample it was not possible to obtain a reliable isochron in the Sm/Nd - Nd/Nd coordinates. Obviously, the history of formation was complex, including several stages that affect the isotope system. According to some assumptions, pseudoisochrons have been constructed, which make it possible to estimate the age of rock formation in some approximation. Analysis of isotope data together with petrographic studies made it possible to exclude the oldest age (1.7 billion years). Other pseudoisochrons (621, 546, 515 Ma), however, also need additional research, but indicate a more probable Paleozoic age of the rocks.

Similar values of eNd (-15..-13) and geological position for both samples suggest one source of rocks. High negative values indicate the introduction of crustal material at the source level. Most likely it was mantle metasomatism and further levels of melting of an enriched source. If the mixture took place under crustal conditions, such a strong shift in eNd resulted in andesites, and not dolerites, as in the case of the rocks under investigation.

Thus, new data on the isotope composition of the Nd in the dolerites of the dykes of the Ners complex, indicate of the formation of rocks from the metasomatized mantle during the Paleozoic period.

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