1. INTRODUCTION

The Pripyat rift is the north-western part of the Pripyat-Dnieper-Donets Rift System. Devonian igneous rocks from the Pripyat rift contain several types of crustal xenoliths: (1) biotite-garnet gneisses (2) garnet-clinopyroxene plagiogranites (mafic granulites) (3) metagabbroids (4) granites. Host rocks are alkali ultramafic lamprophyres, alkali picrites, picrobasalts, alkali basalts and trachytes. They intruded the crystalline basement structures of the East European Craton in the area of the Fennoscandia-Sarmatia junction zone: (1) the Osnitsk-Mikashevich Igneous belt - for the Zlobin field (rift marginal zone) (2) the Bragin Granulite Domain - for the Uvarovichi palaeovolcanoes area (intermediate rift zone) and southeastwards (Mukhach et al., 2001).

The main reasons of our study are: (1) new precise isotope and geochemical data acquisition for the xenoliths (2) FT estimations for the xenoliths (3) assessment of rock sources and protoliths (4) development of our understanding of crystalline basement structures beneath the Pripyat rift.

2. GEOLOGICAL SETTING

The Pripyat rift crosses from NW to SE the two crustal domains: the Osnitsk-Mikashevich Igneous Belt (OMIB) and the Bragin Granulite Domain. The OMIB contains large granodioritic, granite, gabbroic and dioritic plutons, which are weakly deformed and metamorphosed, and subordinate meta-basalts, meta-anidesitic and meta-rhyolitic volcanic and dyke rocks of Palaeoproterozoic age (between ca. 2.2 and 2.1 Ga). In addition, the OMIB contains large granodioritic, granitic, gabbroic and dioritic plutons, which are weakly deformed and metamorphosed, and subordinate meta-basalts, meta-anidesitic and meta-rhyolitic volcanic and dyke rocks of Palaeoproterozoic age. It is considered as a major part of the OMIB that is associated with the development of the Middle-Palaeoproterozoic deep faults of SE Strike. According to Bogdanova et al. (2016), the OMIB is a suture zone of 2.0–1.95 Ga age with traces of Andean-type magmatism, denoting Fennoscandia-Sarmatia Junction Zone. The Bragin Granulite Domain contains meta-xenocrystic granulate-facies rocks and migmatites with subordinate minor bodies of mafic rocks (Kuzmenkova et al., 2015). It is attributed by Aksementova & Tolkachkova (2012) to the Archasian, whereas Bogdanova et al. (2016) consider it as a palaeocontinuation of the Teteriv series of the Ukrainian Shield of Palaeoproterozoic age (between ca. 2.2 and 2.1 Ga). In addition, the OMIB contains younger, ca. 1.5–1.7 Ga, mostly syenitic to quartz syenite intrusions, which are associated with the coeval AMCG-type Kossien Platon farther south.

3. METHODS

The xenolith rock samples were analysed for major elements by XRF at IIGEM on a PW-2400 (Philips Analytical B.V.) spectrometer. Trace elements were analysed by ICP-MS at the Institute of Problems of Technologies of Microelectronics and Extrapol Materials, Russian Academy of Sciences. The samples were decomposed in acids in an autosol. The chemical yield during decomposition was controlled by adding “Dy”, “Nd” and “Yb”. Analysis accuracy was controlled by measurements of the GSP-2 standard. Minerals were analyzed in thin sections on a JASOL JSM-6480LV scanning electron microscope with energy-dispersive spectrometer INCA Energy 350 at the Laboratory of Local Analytical Methods, Geology-Department, Moscow State University, and at the Laboratory for the Analysis of Minerals at the Institute of the Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry (IGEM), Russian Academy of Sciences, on an XMA-8200 (Job) microscope equipped with five wave-dispersive and one energy-dispersive spectrometers.

4. PETROGRAPHY

Biotite-garnet gneisses

The biotite-garnet gneisses of type 1 are orthopyroxene cumulates, medium-grained syntectonic mafic-ultramafic rocks. They intruded into the crystalline basement of the East European Craton in the area of the Fennoscandia-Sarmatia junction zone: (1) the Osnitsk-Mikashevich Igneous belt - for the Zlobin field (rift marginal zone) (2) the Bragin Granulite Domain - for the Uvarovichi palaeovolcanoes area (intermediate rift zone) and southeastwards (Mukhach et al., 2001).

For garnet-clinopyroxene plagiogranites (mafic granulites) in Figure 3. PM-normalized trace elements diagram for Bt-Grt gneisses.

For garnet-clinopyroxene plagiogranites (mafic granulites) in Figure 8. PM-normalized trace elements diagram for Bt-Grt gneisses.

5. MINERALOGY, GEOCHEMISTRY & P-T

Mineral comparison

Figure 9. P-T estimations for garnet-clinopyroxene plagiogranites (mafic granulites).

6. CONCLUSIONS

The xenoliths from the Pripyat rift are diverse in protoliths, sources and P-T parameters. Biotite-garnet gneisses most likely belong to the Bragin Granulite Domain, gneisses of type 1 are similar to the mafic-ultramafic granulite-facies rocks of the Kuladkin series, and gneisses of type 2 are probably migmatises. Garnet-clinopyroxene plagiogranites are thought to be related to mafic granulites of the OMIB as assumed in (Markwick et al., 2001). Metagabbroid xenoliths are probably related to the basic rocks of the OMIB too. Granite xenolith trace elements pattern is closer to OMIB granitoids patterns than to the Kossien Platon patterns, so it is far more likely that this xenolith is derived from the OMIB.

References


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