The age of zircon from crustal granitoids of the Vovcha and Huliaipole blocks: the history of the Earth crust formation of the Azov domain of the Ukrainian Shield

G.V. Artemenko [1*], L.V. Shumlyanskyy [1,2]

[1] M.P. Semenenko Institute of Geochemistry, Mineralogy and Ore Formation of the NAS of Ukraine, Kyiv, Ukraine
 E-mail: regulgeo@gmail.com
[2] Curtin University, School of Earth and Planetary Sciences, Perth, Australia
 E-mail: leonid.shumlyanskyy@curtin.edu.au
[*] Corresponding author

The studied area comprises the junction zone of the Huliaipole granite-greenstone block with the Vovcha and Remivka granulite-gneiss blocks. The Vovcha and Remivka blocks are composed of Archean quartz-feldspathic gneises (>80%), also containing remnants of high-metamorphic rocks of the West-Azov series. The Huliaipole Block is composed of rocks of the West-Azov series and a Mesoarchaean granite-greenstone complex (3,2–3,0 Ga), which includes the Kosivtseve greenstone structure and TTG rocks of the Shevchenko complex. Granitoids are widespread in the area. Archean TTG rocks of the Shevchenko Complex were formed by partial melting of a mafic protolith. The later granitoids of the southern part of the Vovcha block and Dobropillya Complex are still poorly studied. According to petrological data, granitoids of the Dobropillya Complex were formed due to high degree (>50%) melting of the older crust, which consisted of granitoids and metamorphosed ultramafic and mafic rocks. In the Dobropillya granitoids, inherited zircon significantly prevails and, therefore, it is hard to determine the time of crystallization of these rocks. Seventy-nine LA-ICP-MS determinations of U-Pb isotope ages were performed on zircon from granite-porphyry of the Vovcha block. The age of this rock has been estimated by the modal $^{207}Pb/^{206}Pb$ age of the main zircon population as 2840±10 Ma. A small amount of older (up to 3624 Ma) grains has also been detected. Seventy-six LA-ICP-MS U-Pb age determinations were performed on zircon from granodiorite of the second intrusive phase of the Dobropillya massif. In this rock, four main zircon populations can be distinguished. The two oldest peaks (3905 and 3435 Ma) correspond to zircons inherited from an ancient protolith. The main zircon populations has a weighted average $^{207}Pb/^{206}Pb$ age of 2847±20 Ma. Thus, the main zircon populations in the crustal granitoids of both the Vovcha and Huliaipole blocks have an age of 2.8–2.9 Ga. Granitoids of this age have not yet been found in this area and, therefore, there is no clear interpretation of their source. The Archean crust, from which the crustal granitoids of the Vovcha and Huliaipole blocks might have been melted, also included Eoarchean (3.9 and 3.8 Ga), Paleoarchean (3.6–3.2 Ga), and Mesoarchean (3.15–2.95 Ga) rocks. A small group of younger (2350–2135 Ma) zircons reflects the influence of Paleoproterozoic processes, either partial loss of radiogenic lead or the crystallization of a new zircon population. The obtained geochronological data indicates that the Early Precambrian crust of the west-Azov block was formed from 3.9 to 2.1 Ga.

Keywords: crustal granite; West Azov; Vovcha block; Huliaipole block; Dobropillya massif; zircon; U-Pb age LA-ICP-MS method.

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