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The age of monzonitoids of the Mount Yarkeu, Polar Urals: first U-Pb (LA-ICP-MS) and ^{40}Ar-^{39}Ar ages

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Collisional igneous units of the Carboniferous and Permian age in the Polar Urals are poorly studied. This is due to the fact that most of them are probably hidden under the Mesozoic-Cenozoic cover of the West Siberian Plate. Thin bodies of gabbroids, lamprophyres, monzonitoids, and granitoids are known (Musyur, Yarkeu, Yayu, and Pogurej complexes), which are usually attributed to the collisional stage of the Uralian orogeny. Their age, in most cases, is based on geological data and methodologically outdated K-Ar ages (Shishikin et al., 2007; Pryamonosov et al., 2001).

We have studied one of the largest intrusions in the Polar Urals attributed (Shishkin et al., 2007) to the Late Carboniferous Yarkeu complex of the West Ural megazone and considered to be collisional. The pluton is located 13 km north of Kharp township, making up most of Mount Yarkeu. The intrusion is predominantly composed of monzogabbro, monzodiorite, and monzonite which form a «ring» structure among the Neoproterozoic plagiogranitoids of the Kharbey-Sob' complex, with which they have indistinct (gradual) contacts. K-Ar dating of K-feldspar and plagioclase mix from quartz monzonite (Pryamonosov et al., 2001) yielded the age of 310±10 Ma.

To clarify the time of monzonitoids formation, we carried out additional isotope-geochronological studies using modern methods (U-Pb and Ar-Ar). From the monzodiorite sample, 48 zircon grains were dated according to the method (Nikishin et al., 2020). Discordance in all cases did not exceed 2%. The individual ^{206}Pb-^{238}U ages of dated grains are in the range from 650–707 Ma, and the average concordant age is 680±2 Ma (95% confidence interval, MSWD=0.35).

The ^{40}Ar-^{39}Ar dating of the primary magmatic amphibole from monzodiorite was carried out by the method of stepwise heating according to the standard method (Travin et al., 2009). In the high-temperature part of the age spectrum, a six-step plateau was distinguished, characterized by 83.5% of the released ^{39}Ar and a value of 669±8 Ma (MSWD=0.62).

The new U-Pb and Ar-Ar Neoproterozoic ages are similar and correspond to the time of formation

of monzodiorites in the considered pluton. The younger Carboniferous K-Ar age (310±10 Ma) obtained from feldspars (Pryamonosov et al., 2001) is probably rejuvenated. The disturbance of the K-Ar isotope system in feldspars can be explained by the significant saussuritization of plagioclase as well as the lower closing temperature of the K-Ar isotope system in plagioclase and K-feldspar compared to magmatic amphibole. Thus, the Late Carboniferous age of feldspars does not correspond to the time of formation of monzonitoids but to the dynamo-thermal events associated with the collisional stage of the Uralian orogeny (Puchkov, 2010), which occurred at the end of the assembly of the Pangea (Kuznetsov, Romanyuk, 2014).

The obtained Neoproterozoic age of monzodiorite is close to the zircon ages 671±4 Ma and 662±6 Ma from the host subduction-related diorites and plagiogranitoids of the Kharbey-Sob complex (Dushin et al., 2014). The monzonitoids of Mount Yarkeu complement the evolutionary trend of the Late Precambrian subduction-related magmatism attributed to the Neoproterozoic Kharbey-Sob' complex.

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