

U-Pb dating of single grains from Early Precambrian polymetamorphic complexes, the Urals

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About twenty polymetamorphic complexes are distinguished in the Urals, which can be attributed to the Early Precambrian with this or that probability level.

Zircon from gneisses of the Kharbey (the Polar Urals), Nyartin (the Subpolar Urals), Alexandrov and Selyankin (the South Urals) polymetamorphic complexes was studied. Five morphologic types of zircon have been established: the first type includes allothigenic, well-rounded grains of different colour; the 2nd, 3rd, 4th, and 5th types are represented by authigenic zircons of different crystallographic habit (Pystina, Pystin, 2002).

Zircon of the 2nd type (round, well-faceted crystals) is appeared to be the most ancient among the authigenic crystals and, as it was noted by many investigators, is mainly characteristic of the granulite facies rocks. Granulitic paragenesis are relict in the investigated polymetamorphic complexes. The contemporary look of these complexes is provided by amphibolite-facies paragenesis. However, taking into account the presence of "granulitic" type zircon in the rocks, it is possible to assume that the gneisses and amphibolites composing the complexes are diaphthorized granulites.

Pb/Pb and Pb/U ages of the 2nd type zircon indicate that this was crystallized within the interval of 2.3-1.9 Ga (2.1-1.9 on single grains).

In recent years, an additional study of zircon from gneisses of the Alexandrov complex has been conducted (SHRIMP-II; Isotopic Research Center, St. Petersburg) for making the age of the early metamorphic stage of Uralian polymetamorphic complexes more precise. The concordia plotted over 9 points corresponds to an age of 2082 ± 6.8 Ga. Early Precambrian dates are obtained on zircons from gneisses of the Nyartin complex either.

The carried out investigations confirm our idea about the wide development of Early Precambrian complexes in the Urals and allow for a well-founded conclusion about the manifestation of one of the early metamorphic stages in these complexes at 2.1 billion years ago.

References

Pystina Yu.I., Pystin A.M., 2002. Zircon chronicle of the Ural Precambrian. UrD, RAS Press, Ekaterinburg, 167 p. (in Russian).