Typification, the genesis, and main age boundaries in the evolution of the Ural Lower Precambrian

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Archean (up to 3.5 Ga) and Paleoproterozoic formations are known in the section of the Ural Lower Precambrian.

According to material characteristics and metamorphic features, we distinguish the following polymetamorphic complexes: gneiss-granulite, gneiss-migmatite, crystalloschist, granulite-metabasite, eclogite-gneiss, and eclogite-schist [1].

The lowest age of metamorphic processes in granulite complexes (gneiss-granulite and granulite-metabasite) is limited by 2.8-2.7 Ga. The dynamic regimes of this metamorphic phase varied from moderate (gneiss-granulite complexes) to relatively high (above 10 kbar, granulite-metabasite complexes).

Gneiss-migmatite complexes were formed under sequential manifestations of the granulite metamorphism which was replaced by the amphibolite facies metamorphism of moderate pressures and accompanying granitization. The lowest age limit of this metamorphic stage is ca. 2.1 Ga. The time of the amphibolite facies metamorphism in the gneiss-migmatite complexes is estimated as 1.95-1.75 Ma.

Eclogite-gneiss and eclogite-schist complexes, obviously, also belong to the Lower Proterozoic. Eclogite formation could take place synchronously with the granulite metamorphism, ca. 2.1 Ga in the lowest age.

The evolution of ultra-high-temperature and high-pressure metamorphic processes in the Ural polymetamorphic complexes generally correlates with the metamorphic development of the Early Precambrian complexes, adjacent to the west of the platform area. Thus, accretion-collision complexes formed 2.88 to 2.58 Ga in the Fennoscandian Shield (Fennoscandia) were revealed. The granulite and eclogite metamorphism correlates in time with uniting of the Volga-Ural region and Sarmatia (ca. 2.1 Ga), and more recent amphibolite facies metamorphism and associated granitization - with merging of these two megablocks and Fennoscandia (1.8-1.7 Ga).

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[1] Pystin A.M., Pystina Ju.I. Tipification of the Lower Pre-Camrian, Timan-Northern Urals region. Syktyvkar: Geoprint, 2009. 36 p.