

Geochronology of the Archean to Proterozoic Taratash Complex (East European Craton) – evidence for a 1 billion years crustal evolution

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The Precambrian Taratash Complex (Middle Urals) is composed of several granulite- to amphibolite facies crustal segments separated by shear-zones. The complex represents one of the oldest crustal domains in the Middle Uralian orogen, and therefore provides important insight into the Archean to Palaeoproterozoic history of the eastern margin of the East European Craton. Geochronological techniques are essential to unravel this development.

New U-Pb data of monazite and zircon allow a better reconstruction of its tectonometamorphic history. The oldest concordant U-Pb zircon dates cluster around 3038 ± 13 Ma (weighted mean) and are recently detected by LA-ICP-SFMS analysis in a metasediment from Mount Tura Tash characterized by a relict granulite facies assemblage. Another zircon fraction of the same rock yields a weighted mean date of 2923 ± 15 Ma. As a detrital origin of zircon cannot be ruled out it has to be discussed whether these data reflect the ages of granulite facies metamorphism or events in the sediment source area. Formation of granitoid rocks occurring in different crustal segments of the complex was dated at 2344 ± 29 and 2459 ± 36 Ma (U-Pb, zircon). Metamorphic and magmatic cores of monazite from metasedimentary and metagranitoid rocks in the eastern part of the complex yield U-Pb ages of 2244 ± 19 and 2230 ± 22 Ma, respectively, and point to a younger major HT-metamorphic event. The presence of contrasting age spectra in different crustal segments of the complex may indicate dissimilar Archean to Proterozoic developments of these segments.

Resetting of the U-Pb-system in magmatic and metamorphic monazite due to fluid mediated dissolution-precipitation in response to deformation under amphibolite-facies conditions in a major shear zone in the eastern part of the complex is reflected by concordant U-Pb ages between 2052 ± 16 and 2066 ± 22 Ma. This range is consistent with ages of zircon in migmatites (2044 ± 8 Ma) and metamorphic zircon overgrowths (2035 ± 18 Ma, 2032 ± 27 Ma) in three distinct crustal segments to the west of the East Taratash Shear Zone. The geochronological data ranging between 2032 and 2066 Ma therefore record a Palaeoproterozoic orogenic event at the eastern margin of the East European Craton during which the crustal segments now forming the Taratash Complex were amalgamated and intensively deformed at mid crustal depths.