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Abstract Title: Metamorphic history of the Precambrian lower crust from U-Pb dating of zircon, titanite and rutile in xenoliths from central Siberia

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Abstract Text:

Garnet granulite xenoliths from the central part of the Archean Anabar province in Siberia (the Nurbinskaya kimberlite diatreme) show partial re-equilibration under amphibolite-facies conditions. We have modeled mineral associations and obtained U-Pb ages of zircons, titanites and rutiles from garnet granulites to determine the conditions and timing of metamorphic transformations. The granulite-facies association (garnet+clinopyroxene+plagioclase+rutile±ilmenite) was formed at 800-850 °C and 1.1-1.4 GPa in dry conditions. Its age is ≥ 1.88 Ga as follows from the age of metamorphic zircon equilibrated with garnet. The appearance of titanite replacing rutile, pargasite, scapolite, and new Ca-rich garnet requires fluid influx. These minerals were formed at 600-650 °C, 0.9-1.0 GPa. The results of titanite dating show that this event occurred at 1.85 Ga. Rutiles from these samples have discordant ages with the upper intersection with the Concordia at 1.48 Ga that can be related to a slow cooling in the lower crust. Our data show that granulite-facies associations exist metastably in the lower crust and that fluid flux events can drive the associations to re-equilibration in conditions approaching those in stable lower crust beneath Precambrian terranes. This work was supported by a RFBR grant 20-55-18017 Bolg-a, a BAS grant KP-06-Russia/32, and the Resource Center of Microscopy and Microanalysis, SPbU, Russia.

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Keywords:

Precambrian, lower crust and zircon, rutile and titanite

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