

Petrochronology of the lower crust of the Anabar province of the Siberian craton

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Previous studies of lower crustal xenoliths from the Siberian craton have shown that the rocks underwent several metamorphic stages in the Paleoproterozoic, including formation of granulite-facies mineral associations during post-collisional events 1.88–1.84 Byr ago. Using new data, we suggest that the metamorphic history of xenoliths from the central part of the Anabar province and from its western margin differs in the timing of earlier events. At the western margin (Udachnaya diatreme), lower crustal rocks experienced metamorphic episodes during 1.94–1.90 Ga, which correlate with collisional events on the Anabar shield. In the central part of the province (Nurbinskaya diatreme), Archean ages are retained in metamorphic zircon from both mafic and felsic garnet granulites. The longest record comes from a plagioclase-rich granulite, which contains zircon with low-Th/U relic cores and three metamorphic shells. The innermost shell is ~3.1 Ga old. The next overgrowth is ~2.2 Ga old; and the outermost rim is 1843±21 Ma. This rock is a residue from high-degree partial melting of a sedimentary or granitoid protolith and contains a rare assemblage of garnet, minor biotite, rutile, kyanite and corundum that formed under conditions similar to those inferred for mafic garnet granulites. Phase equilibria modeling gave a path from 900°C, 1.2 GPa to 700°C, 0.9 GPa. U-Pb rutile age is ~1.4 Ga, same as in mafic granulites. Most probably, the 2.2 Ga-old metamorphic shells equilibrated with garnet at 900–1000°C. Felsic xenoliths from the middle crust contain metamorphic zircons older than 2.0 Ga. Zircon from a metasedimentary garnet gneiss recorded a metamorphic event at 2758 ±9 Ma and did not respond to a later event that produced garnet. We conclude that the crust of the Anabar province was built tectonically; complexes with different thermal histories were stacked together in the Paleoproterozoic. The lower crust was significantly reworked during post-collisional thermal events (1.88–1.84 Ga); nevertheless, it preserved

evidence of metamorphic events at 2.2–1.9 Ga, contemporaneous and preceding the amalgamation of the craton, as well as events at ~2.6 and 3.1 Ga. Archean high-grade metamorphic rocks were involved in building the lower crust of the central part of the Anabar province.