



U-Pb and Sm-Nd data for the late Archean eclogites of the Kola Peninsula (NE Baltic Shield)

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Late Archean eclogites were found in the Wide Salma area (Kola Peninsula) (Geological Map of the Kola region, 1986; Konilov et al., 2004). Eclogite rock assemblage (eclogite, eclogite-symplectite, eclogite-restite and garnetite – two last types are considered to be a residue of partial melting of eclogite protolith (Konilov et al., 2004)) have been analyzed by U-Pb and Sm-Nd methods.

Isometric zircons from eclogite sample are characterized by high Zr/Hf, low Th/U ratios and low U content - zircon type common for high-pressure rocks. These zircons yielded an age of 2695 ± 26 Ma, which coincides within error limits with the age of similar zircons from eclogites of the Northern Karelia (2720 ± 8 Ma - Volodichev et al., 2004). Zircons from eclogite-residue are short-prismatic with mass of inclusions and high Th/U ratio (1-1.5). BSE images and microprobe study show complex internal structure of zircons with parts of different Hf and Y contents. Qualitative analysis of inclusions identified most of them as quartz, also rutile was detected. It assumes that zircons grew simultaneously with association Grt+Omph+Qtz+Ru under eclogite facies conditions. U-Pb TIMS age of zircons is 2684 ± 80 Ma. Large error is caused by tendency of points to scatter inside the triangular between 2.7-1.8-0 Ga. Such picture reflects two episodes of radiogenic lead loss: during Svecofennian and modern time; this interpretation implies that the obtained age corresponds to the minimal age of eclogites. More correct age (2820 Ga) for these zircons was obtained by LA-ICPMS method in Australia, Sidney (Natapov et al., 2005). Complex internal structure of zircons is reflected in the scatter of ages, ranging from 2.8 to 1.9 Ga, once again confirming a strong influence of the Svecofennian metamorphism. Thus, eclogite formation (Grt +Omp (Jd 0.25-0.32) + Qtz + Ru) during prograde metamorphism ($\sim 700^\circ\text{C}$ and P - 14-15 kbar (Konilov et al., 2004) occurred 2.7-2.8 Ga ago.

Sm-Nd dating of minerals (Grt, Cpx (diopside) and WR) from eclogite-restite and eclogite-symplectite determined a time of decompression (Cpx-Pl symplectites replacing Omp and Cpx-Pl coronas between Grt and Qtz, $T = 727 \pm 24^{\circ}\text{N}$ and $P = 10.7 \pm 0.7$ kbar (Konilov et al., 2004)) at 1.89 Ga. So, exhumation of eclogites took place in the Svecofennian time probably as a result of the Lapland collision.

Eclogites underwent the final stage of metamorphic alteration (Amp-Pl rims between garnet and symplectites at $650\text{-}700^{\circ}\text{N}$ and 7-9 kbar – Konilov et al., 2004) together with the surrounded TTG gneisses of the Belomorian complex. Zircons from garnetite consist of core parts similar to zircons from eclogite-restite (inclusions and high Y contents) and wide pure rims rich in Hf. Rims (LA-ICPMS) yielded an age of 1891 ± 17 (Natapov et al., 2005) as well as metamorphic zircons from TTG gneisses (Bibikova et al., 2004).

Rutile U-Pb ages of 1.79-1.80 Ga – the same as for rutiles throughout the Belomorian Belt (Bibikova al., 1999) – corresponds to the time of rock cooling over T of 450°C – closure temperature for U-Pb rutile system.

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Bibikova, E.V., Slabunov, A. I. & Bogdanova, S. (1999): *Geokhimija*, 8, 842-857.

Bibikova, E.V., Bogdanova, S. & Glebovitsky, V.A. (2004): *Petrologija*, 12, 227-244.

Volodichev, O. I., Slabunov, A. I. & Bibikova, E. (2004): *Petrologija*, 12, 540-560.

Konilov, A. N., Shchipansky, A.A. & Mints M.V. (2004): 32 IGC Florence 2004. Abstracts. I, 108.

Natapov, L. M, Belousova, E. A., & Griffin W. (2005): GEMOC Report. IMP-2005.1.GEMOC. 22 p.