Geophysical Research Abstracts,
Vol. 11, EGU2009-891, 2009
EGU General Assembly 2009
© Author(s) 2008

The Kola superdeep borehole and U-Pb and Sm-Nd data synthesis (in memory of T. Krogh)

O. Denisenko, T. Bayanova, and Y. Yakovlev
(kuli-bin@yandex.ru)

The Kola superdeep borehole (SG-3) is drilled in the central part of the Central zone of the Pechenga rift down to a depth of 12 262 meters. The cross-section of the borehole from the surface down to a depth of 6842 meters consists of the Early Proterozoic volcano-sedimentary rocks. The Archaean amphibolite-gneiss complex (6842-12 262 meters depth) is characterized by laminar bedding and underlies the Proterozoic rock sequence of the Pechenga rift.
The gneisses of the SG-3 cross-section were dated by traditional U-Pb isochron method on zircons and Sm-Nd method on rock-forming minerals.
The tonalite gneiss formed in the interval of 2.93 – 2.81 Ga. The 2.77-2.55 Ga events reflect the Archaean stage of gneiss metamorphism and pegmatite rock emplacement. The interval of 1.9-1.7 Ga is the time of Svecofennian regional metamorphism and emplacement of the Litsa-Araguba granite that was dated on monazite, titanite, and zircon.
The Sm-Nd isotope WR age of 3.15 Ga is thought to be the oldest for the protolyte of the local Archaean amphibolite.
Three age groups of amphibolites have been distinguished, one Early Proteozoic and two Archaean, the oldest of whose (3.15-2.89 Ga) being the relic of the greenstone belt formed in the oceanic crust. The protolytic amphibolites mostly show negative values of Nd (-0.30. . . .– 5.2) with a few positive (0.59-5.88). It indicates the predominant contribution of the mantle enriched in lithophile elements to their genesis.
The total of the U-Pb and Sm-Nd data corroborates the polychronous nature of the local Archaean rock genesis and reflect laminar and blocky structure of the cross-section in contrast to the previously suggested rhythmic stratigraphy.
New U-Pb data on baddeleyite and zircon of the Pechenga Cu-Ni deposit and surrounding rocks varying from 2.3 to 1.7 Ga reflect exact emplacement time (1980+/-10 Ma) of the ore-bearing gabbro-wehrlite intrusions and long-term magmatic (plume) activity.
All investigations are supported by 08-05-00324 and ITP K-0194.