



Deep mantle roots of Zarnitsa kimberlite group, Yakutia comparison of small and large pipes: focused flow through the group center .

Igor Ashchepkov (1), Alexander Ivanov (2), Nikolai Medvedev (3), Anatoly Saprykin (3), Nikolai Vladykin (4), Sergey Kuligin (1), Theodoros Ntaflou (5), and Kate Kiseeva (6)

(1) N.V. Sobolev Institute of Geology and Mineralogy SB RAS, Geology, Novosibirsk, Russia (igor.ashchepkov@igm.nsc.ru), (2) Geo-Scientific Research Enterprise ALROSA Company, Mirny, Russia, (3) Nikolaev Institute of Inorganic Chemistry, Novosibirsk, Russia, (4) A.P. Vinogradov Institute of Geochemistry SB RAS, Irkutsk, Russia, (5) University of Vienna, Dept. of Lithospheric Research, Austria, (6) University College Cork, Ireland

Zarnitsa kimberlite pipe largest in the Daldyn , Yakutian consist of of grey kimberlite breccia (GKB) and rare porphyric kimberlites containing fresh olivine and pyroxene grains as and xenoliths of garnet harzburgites with glimmerite veins containing mica, richterite, clinopyroxene and ilmenite, sheared lherzolites, Cr- bearing websterites with Cr-hornblende and eclogites. The mantle structure reconstructed with monomineralic thermobarometry shows stepped geotherm similarly to the Udachnaya pipe with irregularly heated HT pyroxenite lenses at 2.5-1.0 and 4 -5 GPa. The cold dunite (34 mwm-2) lenses are located at 2-3.5 and 5-6 GPa whereas hot sheared peridotites trace lithosphere base 6-7GPa. represented by the FeO-depleted peridotites with the garnets. Eclogites are correspondent 3.5-6.0 GPa interval The basic cumulates and phlogopite-ilmenite-garnet pyroxenites locate near the Moho boundary. Ilmenite TiO_2 - Cr_2O_3 trends are spepped with 3 major groups in middle part and enrichment in the beginning and the end.

The trace elements in the minerals of mantle peridotites of common type show the peak in Pb, U indicating subduction origin, but the enriched type reveals high HFSE (especially Th) and Sr enrichment due to carbonatite metasomatism which is common for most Ti - augites and low Cr diopsides tracing ilmenite trend indicate fractionation processes in several levels in mantle column. The Cr-diopsides (group 1) shows smooth inclined TRE patterns with some variations in HFSE. The group 2 Cr- and Na- rich show more highly inclined and abundant in REE with elevated Nb, Th, Zr. The Cpx from granulites has Eu anomalies, highly inflected REE patterns and low TRE content. The eclogitic omphacites and garnets have negative Eu and HFSE anomalies and the REE patterns show an inflection at Gd. The Cpx from the sheared lherzolites have straight line REE patterns and depressions in HFSE. Garnet REE patterns are round with the top at Gd-Tb.

In concentrates, the Cr-rich pyrope containing up to 20% Cr_2O_3 highest in Yakutia from dunitic lherzolitic to pyroxenitic are enriched in TiO_2 showing S-shape (dunitic) to concave up (pyroxenitic) and are enriched in U, Th, Nb and Ta. The TRE of the dunitic garnets have lower TRE abundances than those from the sheared lherzolites and show HFSE troughs.

Interaction with protokimberlites dissolve common octahedral and create rounded mosaic diamond and probably large gems. The other pipes like Osennyaya also contain deegarnets – ti 13.5 of lherzolitic type and to 18 Cr_2O_3 green wehrlitic type and high amount of dunitic pyropes But they are not Ti rich. And the and the level of the HFCE is not high as in Zarnitsa. So the protokimberlite melts pathed mainly through the feeder in Zarnitsa mainly causing carbonatite metasomatism. RBRF grants 16-05860;16-05-00788