



Structure of the mantle lithosphere beneath the Siberian kimberlite pipes reconstructed by monomineral thermobarometry

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The original methods of the monomineral thermobarometry for clinopyroxene, garnet, ilmenite, chromite (Ashchepkov, 2008) and orthopyroxene (Brey, Kohler, 1990- McGregor, 1974) thermobarometer allow to reconstruct the mantle columns.

TP diagram for Udachnaya pipe suggests creation at least in three stages of the melt percolation through the mantle column differing in Fe# and other parameters. The most high temperature (HT) (45 mvm-2) and Fe# rich refer to the last HT reactions with the protokimberlite melts formed the megacrystalline associations. Relict low temperature (LT) geotherm (35-45 mvm-2 and lower) is close to the conductive geotherm (Boyd et al., 1997). Most of parameters for the minerals refer to the middle part of the geotherm (40-45 mvm-2). Monomineral thermobarometry reconstructing the PTX values (Fe#, CrCpx, CrIlm, CaGar, TiChr) showing the high overlapping formed by the melt percolation. The clinopyroxene growth in the mantle lithosphere in Daldyn, Akakite, Nakyn and Upper Muna are produced by the refertilization events under the influence of the protokimberlite melts. Their spreading in the lower part of mantle section of Garnet trend to subcalcic and pyroxenitic types is likely the result of submelting and heating of the mantle peridotites. Similar process for eclogites is responsible for the appearance of LT eclogites tracing subduction gradients and HT branches with the Ti-bearing associations corresponding to advective gradients.

. For the larger pipes the scale of the perturbation is much higher than for smaller. The levels of the melt intrusions are reconstructed by the clotting of TP values, inflections of TP paths and TiChr, CrIlm and Fe#. Ilmenite trends reveal the polybaric character of the fractionation and high degree interaction with the wall rock peridotites visible by CrIlm increase. The metasomatic associations differ in PTX diagrams by higher Cr and LT conditions the HT megacrystals.

The evident layered nature of the mantle columns (10-13) is reconstructed by the stepped TPX trends formed at first by the combinations of subduction and superplume events coinciding with the Re/Os ages (Spetsius, 2007), overprinted by the reactions with the plume and other percolating melts. The Fe# increase near the 60 kbar refer to the last superplume events the previous leave similar rhythmic Fe-dunite horizons at 11-12 levels.

The comparison of the compositions of minerals and reconstruction of mantle roots for several phases for Yubileynaya, Udachnaya and Nyurbinskaya pipes allow to reveal the evolution of the magmatic sources and their interaction with the mantle lithosphere.

Reconstruction of the mantle columns beneath 60 pipes allow to make the transects of the kimberlite fields and the 3D model of the mantle beneath the dense kimberlite clusters with many close located diatremes

Mesozoic mantle columns beneath the Anabar, Olenok, Aldan show the HT -Fe# alteration in 60-40 kbar due to interaction with the PT superplume, but relict and LT and low Fe# associations occur to 60 kbar also. RBRF 05-05-74718, 06-05-65021, 06-05-64416.