Geophysical Research Abstracts
Vol. 14, EGU2012-2978-1, 2012
EGU General Assembly 2012

Structure and evolution of the mantle column beneath the Nakyn kimberlite field.

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Nakyn kimberlites refer to the main stage of kimberlite magmatism in Yakutia (Agashgev et al., 2004) Upper Devonian (UD) kimberlites. Minerals from the concentrates analyzed by EPMA and LAM ICP from Nyurbinskaya, Botuobinskaya pipes and Maiskaya body and placer were compared to determine mantle structure and compositions. Peridotite garnet population of all pies corresponds the lherzolite field to pyroxenitic 15% $Cr2O_3$ (Pokhilenko, Sobolev, 2004), the subcalsic garnets prevail in (8-11; $Cr2O_3$). Peaks of the TiO_2 and Na2O correspond to the same $Cr2O_3$ intervals. (Zinchuk et al, 2003). In chromite trend $Cr2O_3$ (65-20%) lognormal decrease with TiO_2 enrichment 3.5% in the beginning. In tuffs containing clinopyroxenes from Nyurbinskaya, Botuobinskaya pipes show decrease of Na, Al Ti and Cr rise with Fe as for Mir pie. The Cp in Nurbinskaya tuffs with Ilm are higher in TiO_2 Restricted in TiO_2 ilmenite trend show rapid decrease of Na2O, MgO content and V2O5 -FeO rise (Fig. 4).
The $PTFO_2$ diagrams determined with new variant of the monomineral thermobarometry (Ashchepkov et al., 2010; 2012) reveal a bit different geotherms for Nyurbinskaya pipe 38 to 43 mv/m2 for garnets and Sp estimates and colder for CPx. The refertillization interval markedby Fe rich Cpx and Ilm is 65-30 kbar. For the Botuobinskaya pipe there are 2 branches 40 and 35 mv/m2 and the heating branch at 65 kbars. Mayskaya is showing the colder geotherm but deviations to the hotter part correspondent to the pyroxenites. The Placer in this area show the wider variations of PT conditions and refertillization interval possibly showing possibility of another source of the disintegration which is much rich in the pyroxenites which amount is highly increase with the depth. The comparisons of the PT conditions show that possibly the Mayskaya and Botuobinskaya pipes represent the earlier stages of the developing of mantle columns while Nyurbinskaya the later one but amount of pyroxenites in Nyurbinskaya is less then in Mayskoe. The pyrope diamond inclusions (Specius et al., 2008) are referring to the Fe- rich refertillization pyroxenitic trend and possibly represent the stage of the
The HT coarse grained green megapyroxenites are abundant as well as the discrete mica are tracing feeding system. Ilmenite megacrysts probably trace mainly the deeper part of the pre- eruption feeding system.
TRE for the garnets from Nurbinskaya pipe show primitive rounded REE pattern with small Ce minima. Degree of depletion is correlating with depth of the minima in HMREE. All of them display strong peaks in Pb and U typical for the subduction - related melts they are rather high in Ta but have Nb minima. The Clinopyroxenes display the rather unusual Th peak typical for carbonatitic melts (related to protokimberlites).
All the geochemical features of the minerals in concentrate suggest the hybridization of the mantle peridotites with the abundant subduction material (pelltic) together with some subducted ocean sediments. Grants RFBR : 11-05-00060