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Fife –mineral concerned monomineral thermobarometry for the mantle columns layering beneath Siberian craton.

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Mononomineral thermobarometry using the kimberlite xenocrystals and xenoliths allows to determine mantle layering with concentrate from kimberlites or placers. O

Orthopyroxene method (Brey, Kohler,1990 T^{o}C for Opx) – and P(kbar) (McGregor, 1974) was used for the calibration of others with the polynomials.

Clinopyroxene. The methods described in the previous papers sue the correlation of the Jd content in clinopyroxene wit the pressure estimated with the Al – Opx barometer .

P_o **=0.04*Kd *T^{o}C/(1-2.4*Fe)-5.5** where ***KD = Na/Ca *Mg/(Al+Cr)***

The 3rd order polynomial provide realistic pressure values for Cr-bearing pyropes ***P = 0.00006*P_o^3 - 0.0156*P_o^2+ 1.6757*P_o (R2 = 0.8245)***. Clculated T^{o}C Nimis –Taylor, 2000 are lower in 100-150^{o}C then CPx (Brey, Kohler,1990) and are corrected ***T^{o}C= 000001*T_o^oC**2 +0.9575*T_o^oC+107.01***

Garnet. Four new garnets thermometers correlating with the estimates T^{o}C based on:

1) OPx's (Brey, Kohler,1990), methods, ***T^{o}C =5272.5*(Ln(KD)/P)^3+10265*(Ln(KD)/P)^2+ 6472* Ln(KD)/P +2113 where KD= MgO*TiO$_2$/((CaO+MgO)^2* FeO*Al$_2$O$_3$***

2) CPx (Nimis, Taylor, 2000), : ***T_0^oC =362.05*(Ln(KD)/P)^3+1880.4*(Ln(KD))/P^2+2659.6* Ln(KD)/P +1695.5*** where ***KD= Na$_2$O*MnO*TiO$_2$/(CaO+MgO)* FeO*Al$_2$O$_3$,***

3) Gar-Cpx (Krogh, 1988) ***KD= Na$_2$O*MnO*TiO$_2$/(CaO+MgO)* FeO*Al$_2$O$_3$,***

4) Ni in garnet thermometry (Griffin, 1989) with the approximation of Ni content by the other components ***Ni(ppm) =88,877*E*** $^{(-5.021*Ni')}$***, (R^2=0.69) ãäå Ni' =MnO*ln(FeO)/ln(MgO)*1.1-0.193*TiO$_2$ +0.003*ln(Na$_2$O)-0.003*Cr$_2$O$_3$+0.0035*CaO+0.004*Al$_2$O$_3$+0.00009*SiO$_2$*** {4} and further ***T^{o}C =0.0004*Ni^3-0.0304*Ni^2 +7.6318*Ni+ 597.2 (*** R2 = 0.69)

Separate variants for the pressures:

1) **P1(kbar)=4+4.975*Cr$_2$O$_3$+0.0135*T^{o}C** for pyroxenites

2) **P2= ((13.5+ Cr$_2$O$_3$*4.5/(CaO+MnO+0.25*FeO)$^{1.25}$+0.01685*T^{o}C* Cr$_2$O$_3$)-19/MgO/-CaO/5-3.75*TiO$_2$)*5** (R^2=0.81} for HT peridotites

3)**P3(kbar)=(5.25*Cr$_2$O$_3$)/(MgO+MnO+2*FeO)$^{0.4}$+0.02*T^{o}C+22.5*Na$_2$O+MgO/20.+0.5*CaO-TiO$_2$-15+FeO/7)$^{2.5}$ P (kbar)=-0.0001*P^3+0.0081*P^2+0.8078*P+0.8308.** more universal for both shallow and .deep peridotites.

Chromite Dependence of the Cr/(Cr+Al) in spinel from the pressure determined using Al-En barometry (McGregor, 1974) was calibrated using >300 associations (R=0.8). *P=0.86347*(Cr/(Cr+Al)* T^{o}C/14+Ti*0.1*) the second approximation ***P=0.0004*P_o^3-0.0342*P_o^2+1.5323*P_o*** brings to the lineal correlations between the pressures determined using Chr and OPx . The temperatures are determined using monomineral version of the Ol-Sp thermometer (Taylor et al ., 1998) where the ***Fo*** is calculated with empirical equations ***Fo=0.06+0.0005*P*** for P >30 kbar and ***Fo=0.095+0.0001*P_o*** for the lower pressures. The oxygen fugacity calculated ***fO$_2$*** with Sp-Ol oxybarometer (Taylor et al ., 1998) give the lineal correlation with monomineral version made in the same manner (R-0,96).

Ilmenite. Dependence of geikilite minal from the pressure was calibrated using correlation of the peridotite layering and the levels of the magmatic sources crystallizing ilmenite megacrysts for the 30 kimberlite pipes of the Siberian platform. Africa and America ***P= (TiO$_2$-23.)*2.15-(T^{o}C-700)/20*MgO*Cr$_2$O$_3$-1.5*MnO)*T^{o}C/1273*** and further $\boldsymbol{P=10*(60-P_o)/60+P_o}$.

Checking of theses estimates coincidence on data base compiled from 2000 associations (6500) show that the disagreement between the estimates is lower than 5-7 kbar in general but in good statistics the layers boundaries determined with diffent methods are close. Combining together estimates on different minerals from the kimberlite concentrate allow to mark layers in the lithospheric mantle and to suggest their primary lithology and to mark and metasomatic horizons.

Regularities of the lithospheric mantle structure may be interpreted by the geodynamic reasons as well as the developing and type of the metasomatism.

Despite on the difference in the lithologic units between the regions the layering of 11 -12 units are typical for the many pipes not only in Siberia but also for African and other pipes

Thus the older horizons in the bottoms are revered Vend – Cambrian time not only in Paleozoic but for Mesozoic pipes also the amount of the layers seems to be are correlating with the whole World superplum events that were produced by komatiitic melts which should form he asthenospheric lens in the level 300 km close to the Ol-density inversion in these melt. Submelting and cutting of the subduction lens should bring to the flotation of the dunite harzburgites and possibly eclogites and coupling of this slabs with the cratonic lithospheric keel Thus cratonic lithosheric mantle possibly was growing from beneath mainly during superp[lum events. The basaltic superplum events were mainly bringing to rifting and thinning of the lithosphere.

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