STRATIFICATION OF UPPER MANTLE COLUMNS BENEATH VITIM PLATEAU IN MIOCENE AND QUATERNARY

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Series of lherzolite xenoliths from two nearest locations of deep seated inclusions have been analyzed to receive the information about the variations in petrography PTf_{O_2} conditions and construction of the mantle column.

Bereya picrite basalt-tuff lherzolite xenoliths represent starting period of mantle activity referred to the formation of lava plateau. The most common *Ga*-lherzolites are very similar to *Ga-Sp* lherzolites but less oxidized and more fertile *Na, Ti, Al* enriched (fig.1). *Ga* lherzolites features are subdivided to the several groups gradually reducing in grain size and changing in structure from coarse grained porphyric lherzolites through mean grained foliated or deformed to fine- equal - grained varieties together with temperature decreasing from 1150°C to 950°C. The rims on the garnet changing from presumably *Opx* to *Cpx* and *Sp* in this sequence also demonstrate temperature decrease.The lower T° interval (750-900°C) is constructed by coarse grained slightly depleted lherzolites with Phl or *Al*-rich *Px* and *Sp* possibly representing lithospheric mantle.

REE and geochemical features manifest the *Cpx* and *Ga* formation from moving melts. Gradual rise of ***Sm/Nd, Gd/Yb*** ratios, positive correlation of ***LREE*** and negative of ***HREE*** in lherzolite *Cpx* with estimated temperatures in *Ga* lherzolites reveals *Ga* control while low T° *Sp* lherzolites have no *Ga* influence. Phlogopite bearing lherzolites are the most ***REE*** enriched but slightly depleted varieties show crystallization from the carbonatite - like liquid remaining after the migration of more differentiated melt and mixing the remaining liquid. The natural distributions of ***REE*** in *Cpx* (Ionov et al.,1993) are modeling by simple removing of more differentiated melt (Fig.3).

In **Dzhilinda site** the following groups varying in structural features were distinguished. According to PT estimates and their projection on geotherm three temperature intervals and depth levels were found.

1) Most primitive and H-T° (1030-1200 C°) and deep seated peridotites are represented by pseudogarnet and spinel lherzolites, close to them in mineral chemistry with protogranular or porphyroclastic structure with dunite lenses. They represent the jut of the oxidized and undifferentiated asthenospheric material.

2) Next temperature interval 900-760° is exemplified by mean and fine grained lherzolites varying in oxidizing conditions $-1<\Delta logFO_2<-9$ and as suggested was formed under the influence of the most deep seated reduced melts formed Vitim lava plateau. They contain most high-***Al*** spinel and pyroxene enriched in ***Na, Ti, Al.*** The similar but more oxidized and enriched in ***Na, Al*** group is found to be a slightly more high temperature.

3) Low temperature part of the mantle section here consists from the rocks with the contrast chemical features. Fine grained lherzolites very enriched in *Ti* having the highest *Mg'* and interesting chemistry (***NiO*** in ***Ol*** - 0.65-0.85% (common 0.3%). In *Cpx:* ***FeO*** 1.9-2.2%, ***TiO_2*** 1.75-2%, ***Cr_2O_3*** 1-1.2%, *Na_2O* 1.85-2.05%, ***Al_2O_3*** 6.7-7.1%; ***FeO*** in *Sp* the lowest 10-10.5%, but ***NiO*** (0.65-0.75%), ***Mg/(Mg+Al)*** and ***Cr/(Cr+Al)*** ratios are one the highest. Together with most ferriferous varieties (*Cpx* 3.3-3.8%, *Sp* 14.5-16.5%***FeO***) give they represent pyroxene enriched layers. These groups are one of the most oxidized and appeared due to the gradual concentration of differentiated melt in the top. Some depleted pyroxenites and fine grained fertile constitute the other material of the upper low T° section.

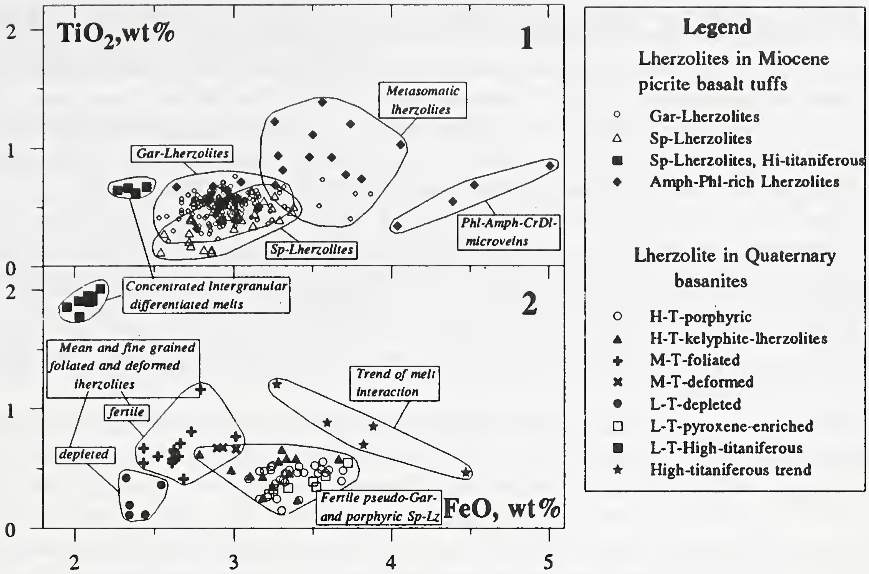

Fig.1. Variation diagram for clinopyroxenes from Vitim lherzolite xenoliths. 1- in Miocene picrite basalt tuffs; 2- in Quaternary basanites of "Lherzolite site".

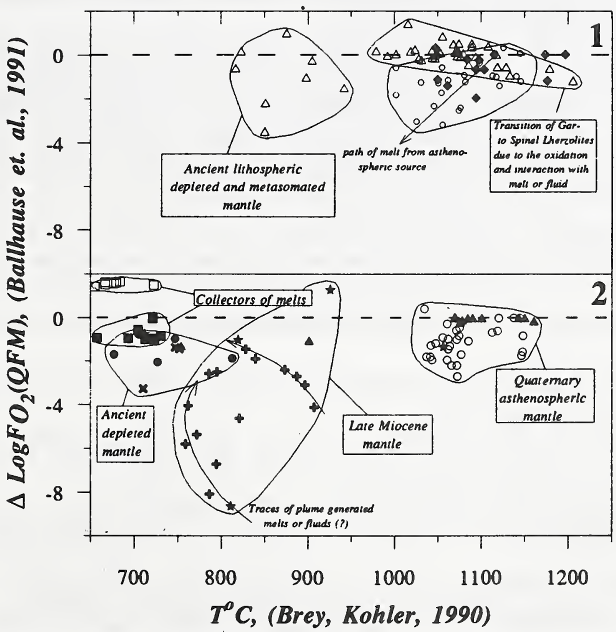

Fig.2. Redox state of lherzolite xenoliths from the Vitim plateau. 1- in Miocene picrite basalt tuffs: 2- in Quaternary basanites of "Lherzolite site

Two types of mantle diapirs or different stages of development of one single are reconstructed by structural and chemical features for two described mantle columns studied. In the ***T-ΔlogFO₂*** diagram (fig 1b,2b) the arrows correspond to the decreasing of oxidation state together with T° possibly referred to the influence of high-T° magmatic source beneath the column. Lines going to the opposite direction trace the concentration of self oxidized melts at the top of the mantle column during the rising of the mantle diapir. This case is typical for all Middle or Late Miocene mantle diapirs (Sovgavan plateau, Far East, South Eastern Saxonia, Eastern Sayan, etc., unpublished data).

The construction of the first is simple development the material rising from garnet facies under the influence of hot masses at the starting period of mantle activity. Only the upper level here possibly represent lithospheric mantle. Low amount of highly differentiated intergranular melts is typical for the last period of volcanism. Phlogopite metasomatose is more characteristic for the garnet phases while ***Ti***-pargasite and kaersutite for spinel facies. The abundance of volatiles including H_2O was possibly responsible for the homogeneity of lherzolite column, abundance of different pyroxenites and reaction rocks.

Long history of formation mantle column explains complex construction of Quaternary diapir. Lower part here is asthenospheric jet, middle part is represented by lherzolites that are typical for the all Late Miocene locations in Vitim plateau. Very low oxidation state is possibly exemplify the path of the most deep seated plum material generated lava plateau. In the upper part two types of melts probably referred to two periods of mantle evolution were concentrated in the lenses enriched in pyroxenites. First is melt equilibrated with lherzolites but highly differentiated due to the fraction crystallization. The next one is correspondent to more ferriferous melts with low alkalinity. Low alkaline basalt were found at the middle and low part of theMiocene lava plateau. Depleted mantle xenoliths possibly are referred to the some ancient period of mantle development of the lithosphere.

Intrusion of melts brings to the fracturing and formation of relatively more oxidized ***Sp*** zones in ***Ga*** lherzolites. The interesting feature is presence of dunite lenses in the lower ***Ga*** bearing porphyric lherzolites in both Miocene and Quaternary mantle columns similar to Burkal (Khentei ridge) (Ashchepkov, Litasov, 1992). and Tokinskii Stanovik (Solovieva, 1994). These lenses seems to be produced by washing of peridotites by fluid or volatile stream connected with deep magmatic system because they have no reaction relations with lherzolites. The dunites and harzburgites are characteristics at deep level of mantle columns sampled by kimberlites (Pokhilenko, et al., 1986). Their origin here may be referred to the ancient subduction derived fluids as well as the influence of the high-temperature volatile enriched kimberlite magma.

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