



On the mechanisms and scales of partial melting of metasomatized rocks of the lithospheric mantle in the seismogenic region under Avachinsky volcano

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In fractured-porous ultramafic xenoliths from the Avacha volcano, the processes of metasomatism and local melting are found in two structural forms.

1) Veins 1-5 cm wide Cpx+Amph±Gl, where CPX crystals locate contact areas Amph crystals of variable content locate in the central part. 2) Spots and veins, from 1 mm several cm, with constituting by Spl+Gl.

Such veined xenoliths compile less 10%, the volume fraction of the glasses with small spinel crystals is < 2%. They are presented uncut and spinel crystals without zonation or their aggregates that contain heterogeneous inclusions: gas, primary melt inclusions and combined with the crystallites of amphibole, clinopyroxene, orthopyroxene and, olivine. The temperature of homogenization of primary melt inclusions in spinel is about 1160°C. Spinel was not observed in the veins of pyroxene-amphibole composition, in which minerals contain gas and melt inclusions. This mineral is not found in amphibole veins and rims on contact with the lava. The Cpx-Amph (±Pl,Mgt,Gl) vein-like aggregates with metasomatized harzburgites have narrow range of temperatures of homogenization 1150°C < T < 1200°C of fluid inclusions and their compositions. They have smooth borders.

The formation of seismogenic cracks during strong seismic events can be favorable for the partial melting within the area of the maximum local temperature excess of the solidus (Tsol) locating in the area of destruction of the continuity of rocks during stress discharge. Evidence in favor of the decompression melting mechanism is the zoning of the compositions (the appearance of amphibole in the central part of the veins) and the presence of interstitial vitreous separations in clinopyroxenes and amphiboles, as well as local melting in harzburgites in spinel splices with inclusions of olivine and orthopyroxene. An explanation of the nature druse-like filling the open fractures with clinopyroxene and amphibole crystals containing melt and gas inclusions can be carried out in the framework of the vapor-liquid-crystal phenomena. The distinct feature is that the weighted average compositions of clinopyroxenes in these veins filling open cracks are quite close. The compositions of minerals of the first and second clusters are very different.

For the pyroxenes deposited within the open cracks, the series of compositions correspond to random variations in the concentrations in local conditions of crystal growth.

Trace element patterns of the Cpx, Opx, and Sp made by LAM ICP MS shows that they mainly have flat REE spectra from Gd to Lu and decrease in left part from Pr to La. The Zr and less Hf Ta, Nb show the depressions. The U peaks are common. Only amphiboles reveal $Gd/Yb > 1$ and LILE enrichment, phlogopites have mainly Ba peaks. Minerals in dunite sample have U-shaped REE spectra. The trace elements thus reveal the small influence of the subducted mantle mainly by participation of fluids. Grant RBRF 19-05-00788