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Composition and evolution of parental melt of Karymsky volcano (Kamchatka) inferred from study of melt inclusions in olivine

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Karymsky volcanic area is specifically known for appearance of two compositionally different magmas – basalts and andesites – on the distance of only 6 km one from another. Eruption of Karymsky volcano in 1996 was triggered by the introduction of new portion of basaltic magma into andesitic reservoir beneath Karymsky volcano (Izbekov et al, 2004). This basaltic melt also reached the surface and erupted in Karymsky Lake. So sampling of basalts from Karymsky Lake and andesites from Karymsky Volcano allowed us to compare compositions of two end-members and trace signs of differentiation, mixing and contamination.

Measuring major, trace element and volatile compositions of melt inclusions in olivine from Karymsky Lake basalts allowed us to calculate composition of parental melt and conditions of its evolution (1180-1110˚C, 6-2.2 kbar, fO_2 around NNO buffer). Modeling of fractionation of basaltic melt at fO_2 around NNO buffer, 1 wt.% H_2O and 2 kbar pressure, which corresponds to the location of andesitic reservoir beneath Karymsky volcano, reproduces precisely the composition of andesite. Degree of fractionation is estimated as 60%. Parental melt contained 0.14 wt.% S and 0.09 wt.% Cl, while groundmass glass in the rocks is substantially depleted in S (0.03 wt.%) and has nearly the same Cl content as estimated parental melts. Using this data and data on volcanic output from Karymsky center during last century, we calculated emission of sulfur and chlorine as 35000 and 8500 tons per year respectively, which is in good correlation with measurements by other methods (Fischer et al, 2002). Although magma mixing and crustal assimilation could play role in the origin of Karymsky volcano an-

desites, the main process responsible for the origin of the bimodal rock association is fractional crystallization.