Geophysical Research Abstracts, Vol. 5, 01966, 2003

THE ORIGIN AND COMPOSITION OF PRIMITIVE MELTS OF KLYUCHEVSKOY VOLCANO, KAMCHATKA - INSIGHT FROM MELT INCLUSIONS STUDY

N. Mironov (1), M. Portnyagin (1,2), P. Pletchov (3)

(1) Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow (2) GEOMAR Research Center, Kiel (3) Geological faculty of Moscow State University (nikita_mir@rambler.ru/++7-095-9382054)

Klyuchevskoy volcano is one of the largest and most productive volcanoes in the world. It is located in the Central Kamchatka Depression on Kamchatka peninsula - a part of Kurile-Kamchatka island arc. Volcanic products are represented by series of high magnesia to high alumina basalts. To obtain information about the composition of primitive melts and conditions of their generation, there were studied 60 melt inclusions in olivine phenocrysts (Fo92-89) from different Klyuchevskoy basalts erupted in the last 4000 years. The most primitive melts start to crystallize at pressure 1.5 GPa, temperature 1250 °C and oxygen fugacity close to NNO buffer. Average composition of the melts is (in wt.%): SiO2=47.9, TiO2=0.8, Al2O3=15.5, FeOtot=8.5, MgO=10.7, CaO=12.8, Na2O=2.8, K2O=0.6, P2O5=0.13, S=0.2, Cl=0.1, F=0.037. Wide variations were found for H2O content (0-3 wt.%). Minimum CO2 content was estimated to be 0.4 wt.% from the density of CO2 Ű rich fluid inclusions in olivine Fo88. Despite general similarity, the melts trapped in high-Mg olivines show variable SiO2 and CaO content. A negative correlation is observed between the two components so that H2O-rich melt inclusions tend to show higher SiO2 and lower CaO compared with H2O-poor inclusions. We suggest that the variations in primitive melt compositions were produced in the mantle source melted in presence of subduction derived fluid with variable CO2/H2O ratio. The higher was CO2 activity in the fluid, the more were shifted the compositions of partial melts toward larnite-normative field with higher CaO and lower SiO2 compared to melts produced at low CO2/H2O ratio

in the fluid. Primitive Klyuchevskoy rocks - magnesian basalts with MgO=9.7-12.2 wt.% - differ from primitive melts trapped in early olivines by higher SiO2 (51.5 wt.%), lower Al2O3 (13.8 wt.%) and CaO (9.7 wt.%) content. Such a difference can be explained if these rocks have an origin by cumulation of magnesium Cpx and Ol in evolved melts, similar to high alumina basalts. In summary, the observed difference between host rocks and melt inclusions of Kluchevskoy volcano calls into question representativity of the rocks as samples of magmatic liquids. It is possible that similar complex processes of magma fractionation occur in many arcs over the world. In this case, melt inclusions can provide more careful and precise insight into the chemistry and origin of primitive arc melts.