CLINOPYROXENE COMPOSITION AND MELT INCLUSION CONSTRAINS ON THE MAGMA MIXING AND FORMATION OF THE MENSHIY BRAT VOLCANO MAGNESIAN BASALTS.

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Holocene Menshiy Brat volcano is a front-arc volcano, which is located inside the Medvezhiya Caldera at the Iturup Island of the Kurile island arc. This volcano is built of isolated andesitic dome and two basaltic and basaltic andesite cinder cones and lava flows, named Korotyshka and Vostok, which cover the dome. This research is focused on the basic lava and siliceous pumice. The lava flows are composed of olivine-pyroxene-plagioclase basalts and basaltic andesites with elevated magnesium contents. Magnesium-rich basalts are considered as most primitive island-arc magmas.

Magnesian basalts from the lava flows of both cinder cones, and rhyolite from the pumice layer located at the Menshiy Brat volcano basis were used in this study.

Glasses of primary melt inclusions in basaltic clinopyroxene have high SiO_2 contents and correspond to rhyolite. Compared to the bulk rock compositions they are enriched in K_2O and Na_2O, and depleted in MgO, Al_2O_3, CaO and FeO. This compositional difference cannot be simply explained by crystallization of pyroxene from the basaltic melt.

Trace element compositions of basaltic clinopyroxenes of the Menshiy Brat volcano is shown in Figs. 1 and 2.

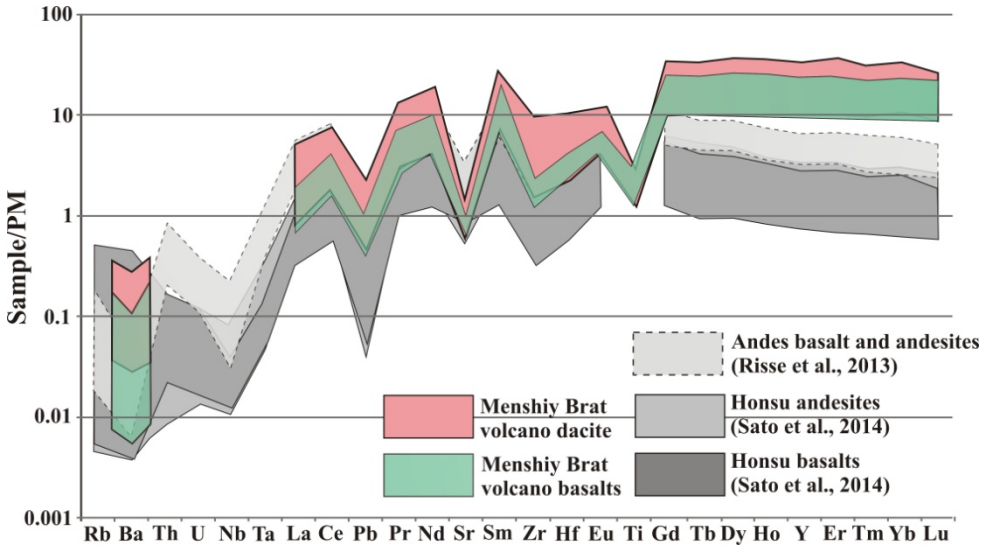

Figure 1.Clynopyroxene composition: distribution of trace elements normalized to primitive mantle (McDonough, Sun, 1995)

Generally distribution of trace elements in the basaltic clinopyroxene from the Menshiy Brat is similar to clinopyroxene from basalts and andesites of the Japanese island arc and the Andes, (Fig. 1). However HREE distribution is different. HREE contents in the Menshiy Brat clinopyroxenes are higher and have flat patterns in contrast to lower concentrations and shallowly sloping patterns of pyroxenes, which crystallized from andesitic and basaltic melts. Chondrite normalized REE patterns (McDonough, Sun, 1995) also illustrate this difference. Figure 2 shows that in contrast to clinopyroxenes from typical basalts and andesites those from the Menshiy Brat volcano have pronounced Eu minimum additionally to flat HREE patterns. It is also notable that trace element and REE patterns of the clinopyroxene from Menshiy Brat basalts, which differ strongly from those of basaltic and andesitic island-arc volcanic rocks, are similar to the pyroxene from the studied dacites from Medvezhiya Caldera.

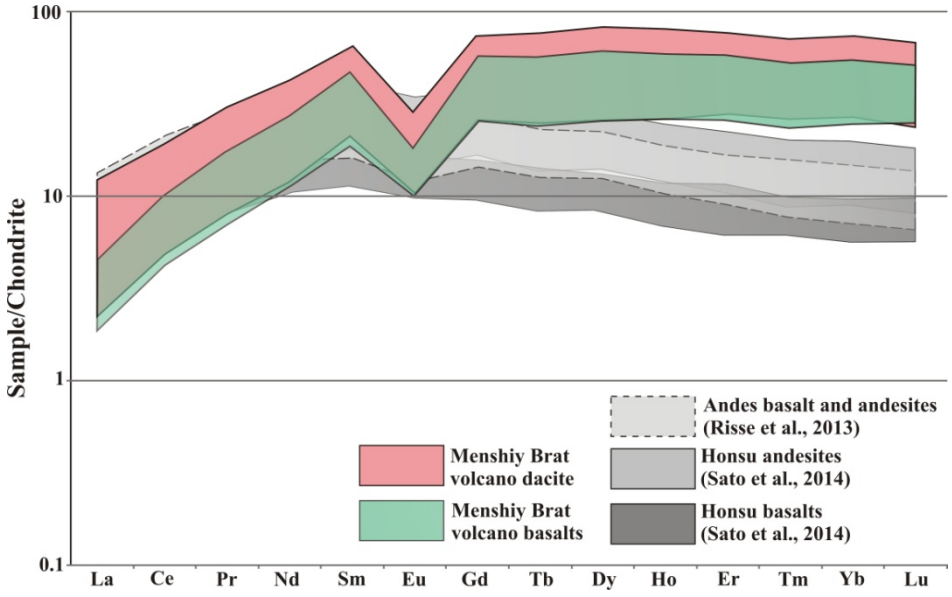

Figure 2.Clynopyroxene composition: distribution of rare earth elements normalized to chondrite (McDonough, Sun, 1995)

Our data show that basaltic clinopyroxene phenocrysts of the Menshiy Brat basalts should crystallize from the silica-rich melts are xenogenous for these basalts. This is confirmed by compositions of clinopyroxene hosted melt inclusions. Although the Menshiy Brat basalts are rich in Mg, and thus can be interpreted as representative of the most primitive mantle magmas, we should state that their composition was affected by mixing between two magmas, the basaltic and rhyolitic, which happened prior to eruption. Rhyolitic melts could be formed as a result of partial melting of island-arc crustal basement rocks by intrusions of the high-temperature basitic magma.

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