

Petrologic characteristics of rocks from the Shirataka volcano, southern part of the Moriyoshi volcanic zone, northeast Japan

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The Shirataka volcano (ca. 1-0.8Ma) belongs to the Moriyoshi volcanic zone in northeast Japan arc. Other than the Moriyoshi volcano, any volcanoes belonging to the Moriyoshi volcanic zone were not studied petrologically in detail. In this study, we present petrologic characteristics of rocks from the Shirataka volcano. In this volcano, following five geological units are related to magmatic eruption; these are the Kokuzo lava, Numata pyroclastic flow deposit, Hagino pyroclastic flow deposit, Shiratakayama-Kitsunegoe-Nishikuromoriyama lava domes, and Higashikuromoriyama lava dome in the ascending order.

Most of the rocks are medium-K andesite to dacite ($\text{SiO}_2=58-65\text{wt}\%$) and subordinate amount of low-K andesite are recognized. The phenocryst assemblages are $\text{Ol}(+/-)\text{-Qtz-Hbl-Hyp-Aug-Pl-Opq.}$, $\text{Qtz}(+/-)\text{-Hbl-Hyp-Aug-Pl-Opq.}$, and Hyp-Aug-Pl-Opq. These rocks belong to calc-alkaline series. Mafic-inclusions can be found in all units and are classified into three types. Type1 ($\text{SiO}_2=50-54\text{wt}\%$) is medium-K basalt to basaltic andesite or low-K basalt to basaltic andesite containing Hbl in groundmass. Type2 ($\text{SiO}_2=55-56\text{wt}\%$) is medium-K basaltic andesite to andesite containing acicular-shaped Pl in groundmass. Type3 ($\text{SiO}_2=55-58\text{wt}\%$) is medium-K basaltic andesite containing lath-shaped Pl in groundmass. Type2 and Type3 lack Hbl in groundmass. Mafic-inclusions draw tholeiitic trend.

The petrologic features of the rocks have changed temporally as follows. The rocks from the Kokuzo lava ($\text{SiO}_2=58-65\text{wt}\%$) are medium-K dacite characterized by Qtz, Hbl phenocrysts, and low-K andesite characterized by $\text{Ol}(+/-)$, Qtz, and Hbl phenocrysts. The medium-K dacite possesses Type1 mafic-inclusions (medium-K basalts to basaltic andesite). The low-K andesite contains mafic-inclusions Type1 and Type2, and these are low-K basalts to basaltic andesite. All of the host rocks as well as the mafic-inclusions in the following units belong to medium-K series. The rocks from the Numata pyroclastic flow deposit (ca. $\text{SiO}_2=63\text{wt}\%$) are dacite to andesite characterized by Qtz, Hbl phenocrysts. The rocks from the Hagino pyroclastic flow deposit ($\text{SiO}_2=58-62\text{wt}\%$) are andesite characterized by $\text{Ol}(+/-)$, $\text{Qtz}(+/-)$, and Hbl phenocrysts, which possess mafic-inclusions of Type1 and Type2. The rocks from the Shiratakayama-Kitsunegoe-Nishikuromoriyama lava domes ($\text{SiO}_2=57-62\text{wt}\%$) are andesite without Qtz, Hbl phenocrysts, which contain mafic-inclusions of Type2 and Type3. The rocks from the Higashikuromoriyama lava dome ($\text{SiO}_2=61-62\text{wt}\%$) are andesite without Qtz, Hbl phenocrysts, which contain Type2 mafic-inclusions.

In general, K_2O contents of the Quaternary volcanic rocks in the northeast Japan arc increase from the front side to the back arc side. The low-K series rocks have been found only in the Aoso-Osore and Sekiryu volcanic zones (volcanic front side) so far. The low-K series rocks from the Shirataka volcano, is important to understand the lateral variation of the rock compositions in the northeast Japan arc.