# The geochemical characteristics of Quaternary adakitic magma from Futagoyama volcano, northeast Kyushu, Japan

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It is well known that the slab melting is one of the important mechanisms transporting the materials from subducting slab to the mantle wedge, in addition to the dehaydration of the slab [e.g. 1]. It belived that the origin of the magma produced adakite is genrated by the slab melting. However, the detailed genesis of adakite is still under the issue [2]. Thus, the accumration of the study for adakite is considered to be important. From the Southwestern Japan arc where Philippine sea plate is subducting, many Quaternary adakittic magmas are observed. Futagoyama volcano is situated at Kyushu island, Japan, and belongs to the Southwestern Japan arc. We determined the trace element and Sr and Nd isotopic compositions of Quaternary magma from Futagoyama volcano.

The results indicate the geochemical characteristics of island arc magma, such as enrichment of LILE and negative anomaly of Nb. Most of the Sr/Y ratios are >40, and the concentarions of Y are < 17ppm indicating the signature of adakite. $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios are from 0.7038 to 0.7041 and from 0.5127 to 0.5128, respectively. The samples indicating high Sr/Y ratio tend to show low $^{87}Sr/^{86}Sr$ and high $^{143}Nd/^{144}Nd$ ratios, respectively. The relationship of Sr and Nd isotopic comositions show obvious tow component mixing curve in between the fields of Shikoku Basin basalts and terreginious sediments on Philipine Sae plate. Shikoku Basin basalt is considered to be a constituent of oceanic crust of the Philipine Sae plate. Therefore, the origin of adakitic magma from Futagoyama volcane can be explained by the slab melting of the Philippine Sea plate together with the tereginious sediments on the plate.

Togeter with Pb isotope ratios, we will discuss the detailed magma genesis of Futagoyama volcano.

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# Highly alkaline, high-temperature hydrothermal fluid generated by Archean $CO_2$-rich seawater

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Hydorthermal alteration of Archean greenstones is characterized by silicification, carbonatization and albitization. Especially, the strong carbonatization caused by Archean $CO_2$-rich seawater formed calcite as a major mineral even in high-temperature altearation zone of Archean subseafloor hydrothermal system [1-3]. Because the presence of calcite in the high-temperature zone has the potential to control composition of the hydrothermal fluid, we conducted thermodynamic calculations based on the phase-equilibria of alteration minerals in Archean altered greenstones. The results predict that Archean basalt-hosted hydrothermal system could generate highly alkaline, high-temperature hydrothermal fluid under high $CO_2$ conditions. The alkaline hydorthermal fluid is characterized by enrichment of $SiO_2$ and relatively low concentration of iron, suggesting Archean basalt-hosted seafloor hydrothermal vents emanated clear- or white-smoker type fluids.

The chemically reactive mixing zones between alkaline hydrothermal fluids and more acidic seawater are characterized by inverse pH and chemical polarity of modern systems, leading to extensive deposition of silica and iron (hydr)oxides on the seafloor. The results provides sufficient silica influx to Archean ocean which has been required from mass balance model, and a new solution of pH-controlled generation of Archean BIF that has been interpreted mainly by the redox chemistry in the Archean ocean. Now lost, high-temperature alkaline fluids would have had a significant role in early ocean geochemical processes.

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