Magma evolution process constructed from pyroclastic eruptives in Niijima Volcano, Izu Islands

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Niijima Volcano is located about 150km south of Tokyo on Zenisu ridge which lies obliquely from Izu volcanic front. This volcano is characterized by voluminous rhyolite and a small amount of basalt. We have focused on pyroclastic eruptives because they have information for eruption sequence and petrological nature of magma. Correlation and sampling of pyroclastic eruptives in Niijima and ajacent islands and EDX analysis of phenocrysts in these eruptives are performed. And we try to clarify pyroclastic stratigraphy and the major process of magma evolution in Niijima Volcano.

25 pyroclastic eruptives are recognized on Niijima Volcano including AT tephra from Aira caldera, K-Ah tephra from Kikai caldera and a few fine-grained tephras from Kozushima Volcano are included.

We emphasize that at least 2 more basaltic eruptives are confirmed besides previously reported Wakago basaltic ejecta. Core samples drilled in Wakago area also support that some basaltic eruptions occurred in Niijima Volcano. As some rhyolite lavas have mafic inclusions, the presence of mafic magma is essential concerned in the igneous processes of Niijima Volcano. The earliest extrusion of mafic magma occurred at Wakago eruption (about 3,000 yBP) to northern part of Niijima Volcano. These facts suggest the possibility of an basaltic eruption around the northern part of Niijima island in the future.

Isshiki(1987) discussed that the major mafic phenocryst have changed from orthopyroxene through cummingtonite to biotite in rhyolite lavas and implied the temperature decrease of the magma. However, we detected at least 3 temperature-increase events based on magnetite-ilmenite geothermometer(by Spencer & Lindsley, 1981). The temporal variations of chemical composition of other phenocryst minerals(plagioclase, cummingtonite, biotite) are consistent with the complex cooling history of the magma. Consequently, phenocrysts in rhyolite pyroclasts indicate that rhyolite magma have not cooled simply with time.