論　説

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浅間火山2004年噴火噴出物の鉱物粒径分布とマグマの結晶化過程

津金達郎*・牧野州明**・三宅康幸**・高橋　康*

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Crystal Size Distribution and Crystallization Process of the Ejecta from the September 2004 Eruptions of the Asama Volcano, Central Japan

Tatsuro TSUGANE*, Kuniaki MAKINO**, Yasuyuki MIYAKE** and Kou TAKAHASHI*

The September 2004 eruptions of Asama volcano, central Japan, ejected essential materials such as pumice with bread crust on September 1st and scoria on September 23rd. The textural and chemical analyses on the materials reveal the crystallization processes in a deep magma chamber and a shallow vent.

Two distinct stages of crystallization can be recognized in size distributions and morphology of plagioclase phenocryst and microlite both in the pumice and scoria. First stage (range Ⅰ): In a deep magma chamber, pyroxene phenocryst began to crystallize out at 1150℃, and then pyroxene and plagioclase continued to nucleate and grow slowly. Second stage (range Ⅱ) is divided into two sub-stages for pyroxene or three (range Ⅱa-c) for plagioclase. Ⅱa: Magma left the chamber and rose slowly through the vent with ever increasing nucleation rate. Ⅱb-c: In a shallow vent beneath the crater, numerous plagioclase microlites like swallow-tailed shape precipitated rapidly under a high undercooling condition induced by decompression. Plagioclase microlite in the pumice and scoria developed a characteristic population density like a bell with a peak at the grain size of 0.003 mm, which is interpreted to reflect a decrease in nucleation rate of plagioclase, in response to crystallization and establishment of equilibrium during the time duration when the magma stayed in the vent. Magmatic temperatures estimated from plagioclase-glass equilibrium decreased to 850℃ before the September 1st eruption. The similarity in crystal size distribution of the pumice and scoria implies that they had a common ascent history, although groundmass in the scoria has lower crystallinity than that in the pumice, suggesting that the magma of the Sept. 23rd eruption stood lower in the magma column than the Sept. 1st magma.

Key words: Asama volcano, crystal size distribution, microlite, pumice, scoria

1. はじめに

2004年9月1日に噴火活動をはじめた浅間火山では，同年12月までに，4回の中規模噴火が発生した．これらの噴火では，いずれも火口から4 km以遠に火山礫サイズ以上の噴出物が降下した．

9月1日の中規模噴火での主な噴出物は安山岩片であったが，軽石の噴出も認められた．その後火山活動は静穏になったように見えたが，9月14日に小規模な噴火が3回発生して以降，18日までの間に2,000回を越す微～小規模噴火が発生した．この間の噴出物は石質岩片に少量の発泡した透明ガラスが混ざる構成から，石質岩片がだんだん減少し，結晶片と発泡したガラス片を主体とする構成となった（星住・他，2004）．また16日午前には火口底に溶岩ケーキがあらわれたことが確認されており，その体積は190万 m^3 と見積もられている（中田・他，2005）．その後，9月23日，29日に中規模噴火が発生した．両噴火での主な噴出物は安山岩片であったが，スコリアの噴出も伴われた．

* 〒390–8621 松本市旭3–1–1
信州大学大学院工学系研究科地球システム科学専攻
Division of Environmental System Science, Graduate School of Science and Technology, Shinshu University, Asahi 3–1–1, Matsumoto 390–8621, Japan.
** 〒390–8621 松本市旭3–1–1
信州大学理学部地質科学科
Department of Geology, Faculty of Science, Shinshu University, Asahi 3–1–1, Matsumoto 390–8621, Japan.

Corresponding author: Tatsuro Tsugane
e-mail: ttsugane@yahoo.co.jp