

Vesicle texture in pumices from the 1914-1915 eruption of Sakurajima volcano.

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The behavior of volatile components in magmas controls the dynamics of volcanic eruption. The vesicle texture in volcanic ejecta may record the behavior of volatile components. So, it is useful for understanding volcanic eruption to observe and analyze the vesicle texture. In this study, the vesicle texture in plinian fall pumices were analyzed to understand the eruption dynamics in the 1914-1915 eruption of Sakurajima volcano.

In this study, pumice samples of plinian fall deposits were collected in about 5km WNW of Sakurajima south crater the 1914-1915 eruption of Sakurajima volcano. The deposits were divided into 10 layers from top to bottom to study temporal variations in the vesicle texture during progress of eruption. Textural analysis for vesicles carried out in 15 white pumices obtained from bottom layer B, middle layer I-1 and top layer J (5clasts per each layer). Bubble size distribution is approximated to exponential function and fitted regression line to express distribution function quantitatively. The result shows that R_0 (an absolute value of the inverse of slope of regression line) increases with time (B: average 8.1×10^{-6} , I-1: average 8.7×10^{-6} , J: average 1.1×10^{-5}), and $\ln(n_0)$ (intercept of regression line) decreases with progress of eruption (B: average 46.22/m⁴; I-1: average 45.68/m⁴; J: average 45.37/m⁴). In addition, bubble number densities estimated from product of R_0 and n_0 decreases with time (B: average $1.1 \times 10^{15}/\text{m}^3$; I-1: average $7.0 \times 10^{14}/\text{m}^3$; J: average $6.2 \times 10^{14}/\text{m}^3$).

Bubble number density (BND) is proportional to decompression rate to the three second power (Toramaru, 1995). So, decreasing in BND with time suggests that decompression rate of magmas decreased with time. On the other hand, the geological estimation by Nakamura (2004) shows the variation in volcanic eruption column height with time (the early stage: 13-15km; the late stage: 6-7km). There is the correlation between volcanic eruption column height as a surface phenomenon of eruption and BND as a textural character of pyroclast, which is an indicator of a conduit process.