

SVC047-P07

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## Vesicle nucleation, growth and coalescence processes in felsic magma, inferred from textural change in a volcanic bomb

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For further understanding of vesiculation and gas separation processes in felsic magma, we analyzed vesicle textures of a volcanic bomb from a vulcanian eruption of Asama volcano in 2004. Rim to core textural analysis of a bomb should provide knowledge of textural evolution, as the time from the vulcanian explosion to the magma solidification at the surface should have increased toward the core of the bomb.

The radius of the bomb is about 10cm. Regardless of the position in the bomb, the phenocryst and groundmass microlite contents are homogeneous (40vol.% as whole rock, and 20-30 vol.% in groundmass, respectively). The bomb has step-like textural change, characterized by dense, dark gray chilled margin (ca. 1cm width) and light gray, vesiculated inner part. For the thin section making and quantification of the texture, we chose 6 parts (ca.0.2cm, 1cm, 2cm, 3.5cm, 6, cm 8.5cm from the outermost rim) in a section cutting the center of the bomb. Part1, Part2 and Parts 3-6 correspond to chilled margin, boundary between chilled margin and inner part, and inner part, respectively.

Part1 is vesicle-free, while Part2 shows gradual increase in vesicularity. Parts3-6 have constant vesicularity (64-67% in groundmass part) regardless of the distance from the outermost rim. Part2 includes up to 50 micro meter vesicles having circular shape. Parts1-2 probably record vesicle nucleation and growth processes which took place in conduit and in air after the vulcanian explosion. Vesicle-free and vesicle-abundant parts coexist in Part 2, which may provide keys to understand the vesicle nucleation processes.

Although Parts3-6 show constant vesicularity, they show systematic change in vesicle size distribution and number density with the distance from the outermost rim. Volume ratio of vesicles with less than 500 micro meter length shows decrease toward the core; ca. 90% in Part3 and ca. 75% in Part6. Number density of the vesicles with the same size range is lower in Parts 5-6 ( $6.7-6.2 \times 10^4/\text{mm}^3$ ) than in Parts 3-4 ( $11.0-7.8 \times 10^4/\text{mm}^3$ ). On the other hand, vesicles up to 1cm length, seen in naked eyes, are limited to Parts 5-6. In Parts 3-6, vesicles mostly have irregular shape and vesicles of circular shape are mostly connected one another. These findings in Parts 3-6 may indicate evolution of bubble coalescence toward the core of the bomb. Also, the shape relaxation of the coalescenced vesicles may have progressed with the delay of the solidification, as evidenced by the higher circularity of the vesicles in Parts5-6 than in Parts3-4.

Keywords: volcanic bomb, felsic magma, vesicle nucleation, vesicle coalescence, vesicularity, vesicle size distribution