Magma chamber structure of Katazoe scoria eruption, Ohachi volcano at Kirishima volcanoes

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The structure of magma chamber is documented by eruptive episode from Kirishima volcanoes, on the basis of stability relations of crystal assemblage in phenocryst. Katazoe scoria eruption in Ohachi volcano at Kirishima volcanoes have erupted three types of magma, each magma composition are Basalt, Basaltic-andesite and Andesite. This diversity is considered to be derived by fractional crystallization based on the bulk rock chemistry. Phenocryst assemblage of Basaltic-andesite is plagioclase, olivine, augite and orthopyroxene. In this rock olivine phenocryst without pyroxene reaction rim coexists with orthopyroxene phenocryst. Eutectic relations between olivine and orthopyroxene are at high-pressure conditions from the pervious phase equilibrium experiment. Magma chamber in Katazoe eruption was estimated to be at shallow depth (1-2kbar) from other experiment using similar magma compositions. Thus this assemblage is not stabilized in this condition. Crystal aggregate in this rock does not have the isolated olivine crystal, and contains the orthopyroxene reacting with olivine. The compositions of mineral in this crystal clot are similar to isolated phenocryst, this clot is cognate inclusion with magma containing isolated olivine crystal. Thus orthopyroxene phenocryst is inferred to derive from crystal clot (cognate inclusion), which is crystal aggregate at chamber margin area where the magma was relatively to be cool. This crystal clot carrying orthopyroxene was brought in magma moving upward on the eruption. As a result mechanical mixing in the single chamber made this non-equilibrium phnocryst assemblage. This non-equilibrium assemblage implies that the condition of magma composition and magma temperature was around the peritectic point in the magma chamber of Katazoe eruption. It is inferred that such mechanical mixing between melt in the magma body and crystal clot at the margin has occurred as usual in the magma movement like eruption.