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Experimental study on magma plumbing system beneath Fuji volcano

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Fuji volcano, largest in volume and eruption rate in Japan, is located at the center of Honshu, where North Amer-ica, Eurasia and Philippine Sea plates meets. Beneath Fuji volcano, subduction of both Pacific and Philippine Sea plates are undergoing. Eruption of Fuji volcano may be related to large magnitude interplate earthquakes at least in some cases. Magma chamber beneath Fuji volcano is considered to be unusually deep compared with other volcanoes in Izu-Mariana arc. Fujii (2007) interpreted that unusual depth of Fuji magma chamber is due to thickened low density granitic crust by collision of Izu peninsula. Because of the significance of Fuji volcano both in tectonic settings and potential volcanic hazard, there are a great number of studies on Fuji volcano. However, studies focused on magma plumbing system beneath Fuji volcano are limited and there are no high-pressure experiments on Fuji basalt so far. The purpose of this study is to determine the conditions of the magma chamber (P, T, fO2, etc) of Fuji volcano through high pressure melting experiments.

Basalt scoria Tr-1 which represents the final ejecta of Hoei eruption in 1707, was adopted as a starting material. Experiments at 4kbar were carried out using an internally heated pressure vessel (HIP-5000) at the Magma Factory. Temperature conditions were 1050, 1100 and 1150?C, and H2O contents were 1.3, 2.7 and 4.7wt.%, respectively. The fO2 was controlled at NNO-buffer. At 4kbar, magnetite is the first liquidus phase and plagioclase is the second liquidus phase and is followed by clino- and orthopyroxene. Compositions of melts at 4 kbar were determined by EPMA analysis of quenched run products. SiO2 content of melt increases with crystallization and is different from silica non-enrichment compositional trend of Fuji basalt.

In order to explain silica non-enrichment differentiation trend of Fuji volcano, Fujii(2007) suggested that ortho-pyroxene may play important role at the deep magma chamber. Experiments at 7 kbar are in progress using another internally heated pressure vessel (HIP-8600) at the Magma Factory. Phase relations and melt compositional trend at 7 kbar will be reported. Based on high-pressure melting experiments and petrologic study, mechanism of Hoei sub-plinian eruption and origin of the dacite which was erupted at the initial stage of Hoei eruption will be discussed.

Keywords: Fuji volcano, magma, Experimental petrology, Subduction zone, High-pressure experiment