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Water content of Miyakejima Basalt: Melting Experiments of basalt from Miyakejima volcano, Japan

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Miyakejima is an active volcanic island located about 200km south of Tokyo in Izu-Mariana arc. The volcanic activity in 2000A.D. formed 450m deep caldera, yielded gigantic SO₂ emission and total evacuation of its residents until recently. Therefore, forecast of future eruptions of Miyakejima is very important for disaster prevention and precise knowledge on its magma plumbing system (depth, size, water content, etc) is essentially important. We performed melting experiments of one of the least fractionated Miyakejima basalt Miogataira lava (MTL), in Ofunato stage (ca. 10000 y.B.P.). The high pressure experiments were performed at pressures between 0.2 and 0.5 GPa and at temperatures between 1050 and 1200C using internally heated pressure vessels at the Magma Factory, Tokyo Institute of Technology. NNO buffered experiments were performed using double capsule assemblage (inner capsule: Ag50Pd50, outer capsule: Au80Pd20) similar to Hamada and Fujii (2008). MTL contains 23.2 vol% of Ca-rich plagioclase phenocrysts (An88-100), 0.7 vol% of olivine phenocrysts (Fo76-84) and 0.1 vol% of clinopyroxene phenocrysts (Niihori et al., 2003). In our experiments, plagioclase, clinopyroxene and magnetite crystallized but olivine was absent. The anorthite content of plagioclase increases strongly with H₂O content of the melt. Judging from our experiments and composition of Ca-rich plagioclase (An88-100) phenocrysts, the Miyakejima basalt magma should contain 2~4 wt% of H₂O if the magma chamber is located at 0.2 GPa or 8 km depth.

Keywords: Miyakejima, high pressure experiment, magma chamber, water content