Mineral and melt inclusions in anorthite megacrysts in Japanese island arc: clues to the magma reservoir processes

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Ca-rich plagioclase (An > 90) phenocrysts larger than 1 cm is called “anorthite megacryst” and commonly occurs in basalts ~ andesites in Japanese island arc [1,2]. Anorthite megacrysts from Japanese island arc generaly include corroded olivines and other inclusions. For example, red clouded megacrysts from Miyake-island contain microcrystals of native copper [3]. Native zinc and native brass were also found in anorhites from Hachijo-island [4]. In addtion, hydrocarbon was detected in those anorthites [5,6]. Kimata [2] concluded that mixing of crustal components and subducted slab-sediments into the basaltic magma produced these inclusions. Thus mineral and melt inclusions in anorthite megacrysts from other localities also would provide us significant insights into the magma reservoir processes.

We analysed mineral and melt inclusions in anorthite megacrysts from Ogi Peninsula, Niigata, Japan. These anorthite megacrysts occur in basaltic lava erupted in the Middle Miocene at back-arc basin setting. Our results revealed that large (> 1 cm) plagioclase phenocrysts are An92 – An94. Mineral and melt inclusions were found only in such Ca-rich plagioclase phenocrysts. The dominant mineral inclusions are Fe-Cu-Ni-sulfides that occur with mafic melt inclusions. In addition, S and Cl were detected in the melt inclusions. Wallace [7] reported that the S and Cl contents of arc basaltic magmas are greater than those of mid-ocean ridge basalts and concluded that these volatiles are recycled from subducted sediment and altered oceanic crust back into the mantle wedge. Hence we suggest that the present anorthites have grown in volatile-rich conditions owing to the injection of crustal components into a basaltic magma chamber.

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