Eastimate of alkalie basalt magma H_2O content in Kannabe volcano

*Ryo Takahashi[1], Tetsuya Sakuyama[1], Jun-Ichi Kimura[2]

1. Earth Science, Science, Osaka City University, 2. Department of Solid Earth Geochemistry, Japan Agency for Marine-Earth Science and Technology

1. Introduction
Alkaline basaltic volcanism widely occurred in the Chugoku area, southwestern Japan, from Paleogene to Quaternary. Although major, trace, and isotopic compositions of these volcanic rocks have been intensively analyzed, detailed magma differentiation processes have not been examined on the basis of a petrologic study. Here, we conducted thin section observations and determined bulk-rock and mineral compositions of Quaternary-Kannabe alkaline volcanic rocks in order to reveal crystallization differentiation process. Consequently, we concluded that H_2O content in Kannabe magma was ~1.6wt%, which is half as low as the estimation in the previous study.
2. Kannabe volcano : Hidaka Lava, Arakawa Lava, Jugo Lava, Shiwagano Lava
Eruption age of Kannabe volcano acted between 25ka~7.3ka because Kannabe volcano is sandwiched between AT and K-Ah tephra. Kannabe volcano consists of four lava flows erupted from different volcanic centers: Hidaka Lava, Arakawa Lava, Jugo Lava, and Shiwagano Lava in order of age. Bulk-rock SiO_2 contents of Hidaka, Arakawa, Jugo, and Shiwagano Lavas are 48.8-49.1 wt%, 48.9-50.0 wt%, 49.3-50.1 wt%, and 48.8-50.0 wt%, respectively, and MgO contents of those lavas are 6.8-7.1 wt%, 6.5-6.9 wt%, 6.5-6.6 wt%, 6.5-7.2 wt%, respectively. MgO contents monotonically decrease from Hidaka Lava, through Arakawa Lava, to Jugo Lava, whereas Shiwagano Lava covers whole compositional range of the other three lavas. Compositional trend of major elements observed for four lavas can be reproduced by fractional crystallization of olivine, clinopyroxene, plagioclase, and titanomagnetite.
Four lavas have relatively small amount of phenocrysts (<~10vol%). Most of those phenocrysts is olivine. Glomeroporphyritic structure of olivine and plagioclase was confirmed. Olivine which has kink band was not confirmed. All phenocrysts shew normal zoning from analyses of Electron Probe Micro Analyzer, and observation of backscattered electron image. Cores of olivine and plagioclase phenocrysts shew Fo# $[=100Mg/(Mg+Fe)_{mol}]$ = 70~86 and An# $[=100Ca/(Ca+Na)_{mol}]$ = 60~78, respectively. Cores of plagioclase phenocrysts have two peaks of An# = 78 and 66 in the frequency diagram of An#. The plagioclase phenocryst of An# = 66 is pure and shows euhedral, but the plagioclase phenocryst of An# = 78 has pollution zone inside it. On the other hand, olivine and plagioclase of glomeroporphyritic structure shew Fo# = 76~78 and An# = 64~68, respectively. This result suggest that the plagioclase phenocryst of An# = 78 is not a phenocryst crystllized from same magma.
3. Consideration : Estimate of Hidaka Lava magma H_2O content
We estimated magma H_2O content for Hidaka Lava, which have the most MgO content in the four lavas and small plagioclase phenocryst volume (<~1vol%), using a combination of these bulk compositions, plagioclase-liquid hygrometer (Lange *et al.*, 2009), and a geothermometer for olivine-saturated melts (Sugawara,2000 ; Medard and Grove,2008). When the pressure is 0.5GPa, 1.0GPa, the magma H_2O content is 1.3 wt%, 1.6 wt%, respectively. These results are less than magma H_2O content estimated by Zellmer *et al.* (2014). This cause is that Zellmer *et al.* (2014) estimates magma H_2O content using plagioclase which is not phenocryst and shows An# = 82.

Keywords: magma water content, the Chugoku area, alkalie basalt

