Magma process of alkali basalt magma: a case study of the Kannabe monogenetic volcano group

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In the Southwest Japan inner zone of Southwest Japan, whose basement rocks are mainly Sanin granitic rocks, a number of active volcanoes have been observed.
In San'yo-San'in area, the volcanoes are originated in both the subducting Philippine Sea Plate (PHS) and the opening of the Japan Sea back-arc basin (Kimura *et al.*, 2003). However Huang *et al.* (2013) proposed the absent of the Philippine Sea Plate beneath some volcanoes suggesting that the volcanoes in such area are not derived from the dehydration of the PHS slab. In order to reveal the origin of these volcanoes, detailed study of magma process in each volcano is requiered. This study deals with the Kannabe monogenetic volcano group, which is located in the PHS slab-absent area. The Kannabe monogenetic volcano group is composed of six volcanic activities:Nishiki, Ohtsukue, Buri, Tada, Kiyotaki, Kannabe (Furuyama, 1973; Kawamoto, 1990). We collected 37 samples from four volcanoes except for Tada and Kiyotaki. Kawamoto (1986) proposed that the variation of bulk composition among Kannabe monogenetic volcano group cannot be explained by the fractional crystallization of olivine and accretion of plagioclase. Takahashi (2005) considered the crystallization differentiation of olivine and plagioclase, which also failed to explain it. These previous studies ignored crustal assimilation and magma mixing processes. Furthermore, crystallization differentiation process of basaltic magma should be related to other minerals than olivine and plagioclase. In this study, we considered crystallization differentiation including olivine, plagioclase, titanoaugite, and titanomagnetite and the effect of crustal assimilation to investigate magma process of the Kannabe monogenetic volcano group.
We obtained distinct bulk compositions for each lava, especially classified by MgO content. The observed compositional trend of the Kannabe monogenetic volcano group cannot be explained by the assimilation with basement rock of studied area (San'in granitoid: Nishida *et al.*, 2013). On the other hand, crystallization differentiation including abovemetioned four minerals successfully explained the compositional variation of major components (SiO_2, TiO_2, Al_2O_3, FeO, MgO). These results suggest that crystallization differentiation played a major role in the magma process of the Kannabe monogenetic volcano group. The effect of the magma mixing process inferred by textural observations (Kawamoto, 1986) would be discussed in further study.

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