

東北日本弧背弧側，第四紀鳥海火山に産するソレイト系列とカルクアルカリ系列の成因

Generation of TH and CA suite magmas at Chokai volcano in the NE Japan rear-arc

高橋 俊郎^{1*}, 平原 由香¹, 木村 純一¹, 林 信太郎³, 中野 俊⁴, 常 青¹, 宮崎 隆¹, 仙田 量子¹, 巽 好幸⁵

Toshiro Takahashi^{1*}, Yuka Hirahara¹, Jun-Ichi Kimura¹, Shintaro Hayashi³, Shun Nakano⁴, Qing Chang¹, Takashi Miyazaki¹, Ryoko Senda¹, Yoshiyuki Tatsumi⁵

¹ 海洋研究開発機構, ² 山形大学, ³ 秋田大学, ⁴ 産業技術総合研究所, ⁵ 神戸大学

¹JAMSTEC, ²Yamagata Univ., ³Akita Univ., ⁴AIST, ⁵Kobe Univ.

The Quaternary Chokai volcano is located in the rear-arc side of the NE Japan arc. Chokai volcano is a typical stratovolcano and the eruption activities are classified into Stages 1, 2, and 3 (Hayashi, 1984; Ban *et al.*, 2001). Stage 1 lavas are olivine two-pyroxene basalt to two-pyroxene andesite, and the lavas contain phenocrystic minerals in equilibrium with the host magmas with occasional dusty plagioclase, which exhibits disequilibrium. An-contents (An%) of the plagioclase phenocryst cores show unimodal distribution, and An% decreases with increasing SiO₂ in the host lavas (An₉₀₋₈₀ for basalts, An₇₀₋₅₀ for andesites). Stage 2 lavas are mostly amphibole-bearing olivine two-pyroxene andesite with a small amount of olivine two-pyroxene basalt. Stage 3 lavas are olivine two-pyroxene andesite. Most of the plagioclase phenocrysts in the Stage 2 and 3 lavas possess dusty zones or sieve textures. An% in these plagioclase cores exhibits wide range (An₅₀₋₈₀). Bulk-rock compositions of the Chokai lavas plot near the boundary between high-K and medium-K. On the FeO*/MgO vs. SiO₂ diagram, the Stage 1 lavas fall on tholeiitic (TH), whereas the Stage 2 & 3 lavas fall on calc-alkaline (CA) fields. The Stage 2 & 3 lavas collectively show straight trend on MgO vs. SiO₂ plots and MgO content is higher than those in the Stage 1 lavas. Sr isotope compositions of the Stage 1 lavas gently increase with increasing SiO₂ (⁸⁷Sr/⁸⁶Sr = 0.70303 - 0.70341) contrasting to the steep increase shown by the Stage 2 & 3 lavas (0.70288 - 0.70342). The Stage 1 geochemical trends can simply be explained by fractional crystallization of a basalt magma with minor crustal assimilation. The Stage 2 & 3 trends can be generated by mixing between basaltic and felsic magmas. The Stage 1 parental basalt magma differs from the Stage 2 & 3 basalt mixing end-member, chemically and isotopically. The petrological and geochemical characteristics of the Chokai TH (Stage 1) and CA (Stage 2 & 3) suite magmas are similar to those in the Zao and Azuma TH and CA suite magmas found at the volcanic front of the NE Japan arc. Tatsumi *et al.* (2008) and Takahashi *et al.* (2012) have argued that the TH basalt with radiogenic Sr was formed by melting of the lower crustal amphibolite, whereas CA basalt with unradiogenic Sr was formed by magma mixing between a mantle derived-basalt and a felsic magma generated from the TH basalt by fractional crystallization. The same mechanism would explain the TH and CA suite magmas at Chokai. The Sr isotopic composition of the Stage 1 TH lavas overlaps with that of amphibolite xenoliths from lower crustal depth beneath Ichinomegata volcano (0.7032 to 0.7051; Yamamoto and Takeda, 2008). The geochemical features of the xenoliths and the TH basalt suggest that the Stage 1 TH basalt can be formed by melting of the amphibolite.

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