

# Petrology of Takikawa monogenetic volcano group and Shokanbetsu volcano: Temporal and spatial variation of magma at the arc-arc junction

\*Ryunosuke Enoda<sup>1</sup>, Mitsuhiro Nakagawa<sup>1</sup>

1. Hokkaido University

Takikawa volcanic field is located at the junction of the Kuril and the northeastern (NE) Japan arc. It consists of Takikawa Monogenetic Volcano group (TMV) and some polygenetic volcanoes: Shokanbetsu volcano group (SHV) and Irumukeppu volcano (IKV). These volcanoes were active during late Miocene to early Pleistocene, and have ceased their activity since 1.7 Ma (Nakagawa et al., 1993). TMV exists in the central area of Takikawa volcanic field, composed of basaltic lava cone, dyke and sill. SHV consists of some polygenetic volcanoes with basaltic-andesitic lava flows in the western area of Takikawa volcanic field. IKV, located in the eastern area of Takikawa volcanic field, is a polygenetic volcano, consisting of andesitic lava flow. There are several previous studies about volcanic rocks in this district (Oba, 1972; Yagi et al., 1987; Nakagawa et al., 1993; Okamura et al., 2000). Although several major and trace elements about TMV and SHV are reported, the comprehensive petrological and geochemical features of the volcanic rocks from Takikawa volcanic field have not been still revealed.

Monogenetic volcanoes at this district could have been formed under extensional stress field accompanied with spreading of Takikawa structural basin (Nakagawa et al., 1993). Therefore, the geochemical features of Takikawa volcanic rocks are expected to reflect temporal and spatial variations of magmatism around the junction of the Kuril and the NE Japan arcs during late Miocene to early Pleistocene. These features can provide us the important constraint for understanding the tectonics at the arc-arc junction. In order to reveal the magmatic process at arc-arc junction, we have been carried out the petrological and geochemical study about Takikawa volcanic field. We investigated 17 rock bodies in TMV, three volcanoes of SHV: Minamishokan, Etai and Ofuyu. In this presentation, we report the petrographical features, and major and trace elements of whole-rock chemistry of these volcanic rocks. Most of rocks in TMV are augite-olivine basalt. They are absent from plagioclase. Andesite including plagioclase, hypersthene, and resorbed quartz are rarely occurred. In Minamishokan, the rocks in upper part are hypersthene-augite andesite with plagioclase and mafic inclusion. In contrast, the lower rocks are quartz-bearing olivine basalt, including plagioclase with dusty zone and resorbed quartz with augite reaction rim. The rocks of Etai are clinopyroxene-olivine basalt, having plagioclase with dusty zone and inclusions with glomeroporphyritic texture. Ofuyu is composed of quartz-bearing augite-olivine basalt, similar to those of Etai, except for the existence of resorbed quartz.

Focusing on incompatible elements of the primitive basalt, SHV has relatively narrow range showing relatively higher Rb/Zr and Ba/Zr ratios, and lower Nb/Zr ratio. In contrast, TMV shows relatively wide range with lower Rb/Zr and Ba/Zr ratios, higher Nb/Zr ratio. The various ratios of incompatible elements of primitive basalts in this district cannot be produced by crystallization of a single primary magma, but be derived from multiple various primary magmas. Considering the difference in ratios of incompatible elements primitive basalts, SHV has the feature of island arc basalt (low-Nb/Zr and high-Ba/Zr ratios). TMV exhibits the feature of back arc basin basalt with high-Nb/Zr and low-Ba/Zr ratios. These spatial distribution of ratios of incompatible elements shows ellipse zonation, similar to the zonation of SiO<sub>2</sub> wt.% reported by Nakagawa et al. (1993). This feature might reflect the difference in degree of partial melting at producing primary magma or the compositional variation in mantle source, corresponding to the mantle plume model under this district, of which SHV as a center, proposed by Nakagawa et al. (1993). In

order to examine this possibility, we are going to carry out the additional geochemical study using rare earth elements and isotopic compositions.

Keywords: Monogenetic volcano group, Shokanbetsu volcano, Arc-arc junction, Basalt, Mantle plume