The magmatic evolution of Quaternary lavas of Sakurajima volcano, Kyushu Island, Japan

T. SHIBATA[1]*, M. YOSHIKAWA[1], T. KOBAYASHI[2],

D. MIKI[3], K. TAKEMURA[1]

[1] Institute for Geothermal Research, Kyoto University, Japan, tomo@bep.vgs.kyoto-u.ac.jp
[2] Graduate School Sci. Eng., Kagoshima Univ., Kagoshma, Japan
[3] Disast. Prevent. Res. Cent., Kyoto Univ., Kagoshima, Japan

Sakurajima volcano is situated at the volcanic front of the Ryukyu arc, Kyushu Island, Japan (Fukuyama, 1978, J. Geol. Soc. Jpn.), where the Philippine Sea Plate (PSP) is subducting. Shibata et al. (2013, Bull. Vol. Soc. Jpn) emphasized that the mixing of andesitic and dacitic magmas played an important role in the genesis of Quaternary lavas of Sakurajima volcano, and that multiple dacitic magma chambers with different geochemical characteristics once existed beneath the Sakurajima area at relatively shallow levels in the crust. However, detailed processes of magmatic evolution of Sakurajima still controversial. We discuss the magmatic processes on the bases of newly analysed trace element and Sr-Nd isotopic compositions together with those of previous data and Pb isotope ratios.

Although most of the major element compositions show a single linear trend on each of the Harker diagrams, two different trends are discernible on each of the P_2O_5, and TiO_2 vs. silica diagrams, and are subdivided into low-P and high-P geochemical groups. Those two groups show deferent trend in the relation of Sr isotope ratios and silica contents. Sr isotope ratios of the both groups increase with increasing silica contents, and the difference of Sr isotope ratios decrease with decreasing silica contents. Sr-Nd isotope ratios of the most silica poor andesite are relatively less radiogenic, but displaced towards more radiogenic Nd isotope compositions from the mixing curve of MORB-type mantle and subducting PSP. From these observations, it is considered that 1) source materials of primary magma of Sakurajima volcano are MORB-type mantle and slab derived materials, 2) andesite magma might be evolved from the primary magma by AFC process, 3) further AFC or magma mixing of initial andesite and two individual acidic endmember generated the magmas of low-P and high-P groups. The erupted areas of low-P and high-P groups are also different. Therefore, it can be considered that those two groups erupted through individual magma-plumbing system, as emphasized by Iguchi (2013, Bull. Vol. Soc. Jpn).