Magma feeding system in the initiation of Goshikidake activity (Zao volcano, Japan)

Y. NISHI[1]*, M. BAN[1], T. OIKAWA[2], S.YAMASAKI [2], S. SATO [1], D. HERNÁNDEZ[3], A.M. ÁLVAREZ-VALERO[3] AND R. SHINJO[4]

[1] Yamagata University, Yamagata 990-8560, Japan (*correspondence: s14e511m@st.yamagata-u.ac.jp)

[2] National Institute of Advanced Industrial Science and Technology, Tukuba 305-8561, Japan

[3] Dept. of Geology, University of Salamanca, 37008, Spain

[4] Univ. Ryukyus, Nishihara, Okinawa 903-0213, Japan

Goshikidake is the youngest cone (<ca. 2ka) in Zao volcano, composed of piles of pyroclastic surge and fall deposits, which overly associated lavas. Our research on the basal part of the Goshikidake pyroclastics (hereafter pyroclastics), and the lavas, allowed to characterize the magma feeding system in the initiation of the Goshikidake activity.

All rocks are medium-K calc-alkaline olivine bg. cpx-opx andesites, whose textural features suggest a magmatic history that includes processes of magma mixing. Whole rock compositions are similar between the pyroclastics and the lavas, but the former is poorer in SiO_2 (56-57.7 wt%) and shows higher trend in FeO, TiO_2, Rb/Zr-silica diagrams than the latter (SiO_2=57.5-58 wt%). Sr-Nd isotope ratios are similar between both eruptive products.

Mg-poor pyroxenes and An-poor plagioclase derived from the felsic magma, whereas olivine and An-rich plagioclase derived from the mafic magma that occur in both the pyroclastics and the lavas. Local pyroxene phenocrysts show Mg-rich zoning within ca. 30 μm from the rim, formed during the mixing process. The zoning Mg# peak is higher in the pyroclastics than in the lavas. The residence times by comparing the mineral zoning and diffusion profiles for olivine and An-rich plagioclase are similar (<2~3 years) between the pyroclastics and the lavas. Whereas, those for opx Mg-rich zones vary (~hundred years) and the percentage of longer-lived opx are higher in the lavas than in the pyroclastics.

T-P-H_2O for the pyroclastics and lavas, are similar regarding both felsic and mafic end-members, in the ranges of ca. 1000ºC, 1.7-2.7kb, 2.5%, and ca. 1100ºC, <2kb, 2.0%, respectively. The chamber, filled by felsic magma, received repeated pulses of mafic material for ~hundred years. The triggered pulses arrived less than 2~3 years before eruptions. The mafic magma compositions and its involved ratio in the mixing changed from the lava to the pyroclastic phases.