

Geology and Petrology of Torikabutoyama-Yokokurayama, Old Kumanodake, and Nakamaruyama volcanic edifices in Zao volcano

*Shin Sato¹, Masao Ban², Teruki Oikawa³, Seiko Yamasaki³

1.Department of Earth and Environmental Sciences Graduate School, Yamagata University, 2.Faculty of Science, Yamagata University, 3.Geological Survey of Japan, AIST

Zao volcano is Quaternary stratovolcano located in the middle part of the volcanic front of northeast Japan. The activity is divided into six stages (Stage I : ca.1 Ma, Stage II : ca.500 ka, Stage III : ca.350-250 ka, Stage IV : ca.250-200 ka, Stage V : ca.130-40 ka, Stage VI : ca.< 35 ka). We performed geological and petrological study on Torikabutoyama-Yokokurayama, Old Kumanodake, and Nakamaruyama volcanic edifices of Zao volcano.

The eruption products of these three volcanic edifices can be divided into eleven units. These units can be grouped into three (the early period, the middle period, the late period). The early period, the middle period, and the late period eruption products are composed of thick andesitic to dacitic lava flows (Yokokurayama-Torikabutoyama lavas, Gorodake lava, Naganohoppo lava, Sanpokouzinsan lava, Oiwake lavas), thin basaltic andesite to andesitic lava flows (Zaosawatyuryu lavas and pyroclasts, Zaosawajoryu lavas and pyroclasts, Senninsawa lavas and pyroclasts, Zaozeibu lava), thin basaltic andesite lava flows (Nakamaruyama-lower lavas, Nakamaruyama lavas), respectively. The early period is mainly equivalent to Stage II. The middle period and the late period are equivalent to Stage III.

Most of rocks are ol-bg. cpx-opx andesites. Most of plagioclase phenocrysts have dissolution texture such as dusty zone and/or patchy zoning. All rocks of the early period and some of the late period contain dissolutive quartz. Quartz, orthopyroxene, and olivine sometimes have a reaction rim. Mafic inclusions are observed in all andesitic to dacitic rocks. These are several millimeters to tens of centimeter in length. The groundmass texture of most of rocks is hyalo-ophitic, while that of mafic inclusions is dikty-taxitic. We note that troctolite inclusions are characteristically observed in Senninsawa lavas and pyroclasts.

All products belong to medium-K calc-alkaline series. SiO₂ contents of the early period, the middle period, and the late period are 57-62wt. % (some are >65wt. %), 57-62wt. %, 58-63wt. % (some are 55wt. %), respectively. The early period eruption products and the late period show relatively low trends in K₂O-SiO₂ diagram, while the middle period eruption products show relatively high trend. The compositional trends of the volcanic units in these three edifices are slightly different each other.

Keywords: Zao volcano, andesitic lava, calc-alkaline series