

Petrologic characteristics of early part of the Okama-Goshikidake activity of the Zao volcano.

NISHI, Yuki^{1*} ; BAN, Masao² ; OIKAWA, Teruki³ ; YAMASAKI, Seiko⁴

¹Yamagata Univ, ²Yamagata Univ, ³GSJ, AIST, ⁴GSJ, AIST

Introduction: Zao volcano is representative active stratovolcano in NE Japan. The volcanic activity commenced at about 1Ma and has continued to present. The Goshikidake, the youngest cone in the central part, started its activity from ca. 2ka. The present crater lake Okama is in the western part of the Goshikidake. We examined the geologic and petrologic features of the eruption products in the initial period of the Okama-Goshikidake activity.

Stratigraphy: The eruption products can be subdivided into Furikodaki lava, Goshikidake-nanpo lava and pyroclastics, Goshikidake-nanbu pyroclastics, Goshikidake-toubu pyroclastics. The Furikodaki lava flowed down from the northeastern base of the Goshikidake cone along a stream. The length and width of lava are ca. 750m and 20-30m, respectively. The Goshikidake-nanpo lava and pyroclastics cropped out in a narrow area of ca. 650m south from the summit of Goshikidake. This unit is composed of upper brecciated lava with coarser lateral and finer vertical joints, and lower hyaloclastite-like tuff breccia. Goshikidake-nanbu pyroclastics distributes ca. 500m southward from the summit, consisted of pyroclastic surge deposit and vent breccia. The former consists of lapilli tuff to volcanic breccia with ca. 10m in thickness. The latter consists of three veins elongated from northeast to southwest with 2-8m width and 5-8m length. These intrude nearly vertically into surge deposits. They are poorly sorted tuff breccia with minor amount of ~20cm rounded bombs. The Goshikidake-toubu pyroclastics distribute in ca. 300m eastward from the summit. The thickness is ca. 6-35m. They are fairly stratified tuff - lapilli tuff - tuff breccia including various amounts of volcanic bombs.

Petrography: All rocks are cpx-opx andesites. Most of plagioclase phenocrysts has dissolution textures such as dusty zone and/or patchy zoning. Plagioclase of the Furikodaki lava, the Goshikidake-nanpo lava and pyroclasts lack dusty zones. Opx and cpx phenocrysts show usually euhedral to subhedral texture except for some rounded cpx phenocrysts. About half of the pyroxene phenocrysts include sparsely glass inclusions. Cpx content in the bombs of the vent breccia of the Goshikidake-nanbu pyroclastics is higher than other products.

Whole rock chemistry: All products belong to medium-K, calc-alkaline series, with 56 to 58% SiO₂. Looking at in detail, the range of SiO₂ contents of Furikodaki lava, Goshikidake-nanpo lava and pyroclasts is 57.5-58wt%, while that of the other products is 56-57.7wt%. Most of the products are plotted in same variation trends in silica variation diagrams, but the bombs of the vent breccia have higher FeO, TiO₂ contents and lower MgO contents than the other products.

Mineral chemistry: In Furikodaki lava, Goshikidake-nanpo lava and pyroclastics, the core composition of opx phenocrysts is 64-65 Mg#. In the pyroclastic surge deposits, that is around 65 Mg#. In the bombs, that has a range of Mg#62-69. The cpx core composition shows a range of ca. 64 to 70 Mg# in all products. The core compositions of plagioclase phenocryst show wide range of An62-92. In Furikodaki lava, Goshikidake-nanpo lava and pyroclastics, the main peak compositions are in An68-70 and around An78, and subordinate peak is in An90. The pyroclastic surge deposits have main peak compositions of An64-66 and An76-78, subordinate peak composition of An90. The bombs have main peak compositions of An62-66 and An74-76.

Keywords: zao volcano, andestic lava, pyroclastic surge, agglutinate, calc-alkaline