

Stratigraphical and petrological studies of Benri scoria flow in Aso-4 pyroclastic flow deposits, Aso volcano, Japan

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Aso volcano is the largest caldera bearing volcano in central Kyushu, Japan. The large caldera was formed by four pyroclastic eruptions (Aso-1 -4) during 270-90 ka. The latest (90ka) and largest (600 km³) eruption generate Aso-4 pyroclastic flow deposits. They are divided into seven flow deposits in the west side of caldera, and were formed by two sub-cycles eruptions of mafic to felsic magmas (Watanabe, 1979, Kaneko, 2007).

This study focused on the Benri scoria flow deposits (0.5 km³, hereinafter called Benri-deposits), in which the transition of deposits from pumice to scoria are seen. We carried out the detailed field and microscopic observations, EMPA analyses of phenocrysts and whole rock chemical analyses by XRF, and then tried to presume detailed eruption processes in Benri-deposits.

Benri-deposits, about 20m in total thickness, are composed of scoria, pumice, banded pumice, andesitic lithic fragments and pyroclastic matrix (Oshika, 2007). We divided them into seven layers based on essential components. They are as follows from lower to upper part; (1) pumice and banded pumice layer, (2) pumice and scoria layer, (3) scoria and lithic fragment layer, (4) scoria -rich layer, (5) lithic fragments concentrated layer, (6) scoria-rich layer, (7) scoria and pumice layer. Although scoria and lithic fragments are found in most of layers, pumice and banded pumice are in limited layers. Lithic fragments concentrated layer is composed of andesitic lithic fragments (grain size; 3-6cm). The existence of banded pumice suggests the possibility of mingling in the layered magma chamber.

Phenocryst assemblage is plagioclase, amphibole, clinopyroxene, orthopyroxene, (olivine), (magnetite), (ilmenite). The corrosion form and dusty zoning in plagioclase and amphibole are found in most of layers. An mol. % of plagioclase in scoria and banded pumice have wide ranges (An32-97). However, they show relatively narrow ranges in pumice, and the value roughly rise from layer 1 (An30-57) to layer 3 (An50-84). These results suggest that the amount of mafic magma gradually increase toward layer 3. Together with whole rock chemical composition data for scoria and pumice, we try to clarify the eruption process of Benri-deposits.

Keywords: Aso Volcano, pyroclastic flow, scoria, pumice, banded pumice