

Petrological characteristics of Takayubaru lava flow extruded immediately before the catastrophic Aso-4 pyroclastic eruption in central Kyushu, Japan

Kiyoshi Kurokawa¹, Toshiaki Hasenaka¹, Yasushi Mori²

¹Graduate School of Science and Technology, Kumamoto University, Japan, ²Kitakyuusu Mus.of Nat.& Hum.History, Japan

E-mail: 129d8053@st.kumamoto-u.ac.jp

Takayubaru lava flow was extruded during the formation of Omine pyroclastic cone which is located 5 km from the western caldera rim of Aso. Short interval time between Takayubaru and Aso-4 volcanic products was estimated by the lack of intercalating soil formations and nearly identical K-Ar ages for the two.

Observation of drilling core samples shows that Takayubaru lava has upper clinker part, massive part and lower clinker part. Lack of weathering and clinkers are not observed inside the massive part indicating that Takayubaru lava is a single flow unit.

Takayubaru lavas contain about 20 vol.% phenocrysts including clinopyroxene, orthopyroxene, plagioclase and opaque minerals. Most of plagioclase phenocrysts show characteristic fractured texture, indicating melting along cleavage and fractures. They also contain hornblende microphenocrysts (<0.3 mm) varying from fresh to complete opacities.

There is no correlation between phenocryst abundance and chemical composition of Takayubaru lava. Takayubaru lava and Omine scoria show no clear difference in phenocryst abundance and in chemical composition. They both have greater abundance of phenocryst than Aso-4 pumice. Silica content varies from 63 to 66 wt.% for Takayubaru lavas, and 61 to 66 wt.% for Omine scoria samples. The upper to middle part of drilling core is homogenous (<1 wt.% SiO₂). In contrast, the samples from the lowest part and the farthest part have less silica than others, with about 2% variation. Aso-4 pyroclastic deposits contain a wide variation of basalt to basaltic andesite scoriae (SiO₂=49-56 wt.%) and dacite pumice (SiO₂=65-72 wt.%). In contrast, Omine scoria and Takayubaru lava do not contain mafic magma as observed in Aso-4 eruption. The compositional trend of Takayubaru lava is different from that of the silicic member of Aso-4 deposit. It seems that neither the injection of mafic magma nor the over spill of Aso-4 acidic magma were observed in the eruption of Omine cone and Takayubaru lava.