

Surface morphology of the 1951 lava flow, Izu-Oshima volcano

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Izu Oshima is a typical basaltic volcano in Japan, which has issued lava flows several times in the past eruptions. In the 1950-51 eruption, lava flow emplacement processes were observed, but they have not been linked to the formation of surface morphology. Two types of surface morphology, pahoehoe and aa, are recognized on the 1951 lava flows.

As the lava of Izu Oshima volcano is different from that of other basaltic volcanoes such as Hawaii and Etna on chemical composition and the amount of phenocryst, there might be some difference on surface morphology among them. To examine it, we characterized the 1951 lava flow morphologies, and combined them with the record of the emplacement processes.

The 1951 lava flow was treated as single lava flow in the record, whereas many times of outflow from summit crater were recorded. From the geomorphological analysis, we detected nine flow-units. On the field survey we found levees on the slope, and change of surface structure from cauliflower aa to rubbly aa on the caldera floor. These changes were usually seen on typical basaltic volcanoes such as Etna. Block with ropy structure was sometimes seen on aa lava surface, which was thought to be a piece of broken pahoehoe lava surface. Judging from the fact that these blocks tend to decrease with flow distance, they were transported from upstream. Pahoehoe lava was detected even at the flow front. Different from the typical pahoehoe lava with smooth surface, it had rough surface.

Based on these results, the observation record and photograph on lava flow emplacement (Tsuya et al. 1955) were combined with corresponding flow-unit. As a result, the time evolution of flow-unit was clarified, and the behavior of each lava flow was detected. From the description that the lava flowed on the slope as pahoehoe channel flow and continuous crust was formed on its surface, we concluded ropy block on aa surface was formed by the breakage of the continuous crust in the channel. Although pahoehoe lava can not be seen inside the channel due to the coverage with ash at present, the ropy block represents pahoehoe flow regime before the transition to aa. Lava flow further transformed itself from cauliflower aa to rubbly aa as it progressed. Pahoehoe lava found on the flow front corresponds to the secondary outflow from aa lava, that is described in the record. The surface texture of this outflow was similar to that of Hawaiian secondary lava flow.