Eruptive sequence of Koya pyroclastic-flow deposit distributed on Tanega-shima

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Koya pyroclastic flow (Ui, 1973) is a large-scale pyroclastic flow formed at the 7.3 ka (Fukuzawa, 1995) Akahoya eruption of Kikai caldera. Akahoya eruption started from large-scale Plinian eruption which formed plinian pumice fall deposit and intraplinian pyroclastic-flow deposit and terminated with eruption of Koya pyroclastic flow (Machida and Arai, 2003; Maeno and Taniguchi, 2007; Fujiwara and Suzuki, 2013). The pyroclastic-flow deposit is considered to travel across the sea and distributed over the adjacent islands (Tanega-shima, Yaku-shima and Kuchinoerabu-jima) and the mainland of south Kyusyu (Satsuma-Osumi Peninsula) around Kikai caldera (Machida and Arai, 1978; Maeno and Taniguchi, 2007). This pyroclastic flow is traceable up to 80 km away from the source. Products of Akahoya eruption contain two types of volcanic glass shards. The one is “high-SiO_2 glass” (ca. 75 SiO_2 wt. %), and the other is “low-SiO_2 glass” (ca. 65 SiO_2 wt. %). The ratio of both types of glass shards shows vertical variation within the pyroclastic-flow deposit (Fujiwara and Suzuki, 2013). Based on the ratio of both types of glass shards, Fijiwara and Suziki (2013) showed that the early phase products of Koya pyroclastic-flow eruption traveled and deposited on the northward of Kikai caldera. But, the areas southward of the caldera have not been studied.
In Yaku-shima, which locates 30 km south of the caldera, the pyroclastic-flow deposit are 2-3 m thick in north-west coastal area. In addition, the pyroclastic-flow deposit occur in highly inland area (Geshi, 2009). In contrast, in Tanega-shima, which locates 50 km east- to southeastward of the caldera, the pyroclastic-flow deposits are thin (< 0.5 m) and show partially lack in north area (Fujiwara and Suzuki, 2013) although this island has lesser relief (topographic barrier) than Yaku-shima. 5 lack sites were identified in the north area, furthermore, new 2 lack sites in the south-central area were recognized in this geological survey of Tanega-shima.
To reveal the cause of the lack of the pyroclastic-flow deposit, we attempted to correlate the eruptive sequence for deposits on Tanega-shima based on Fujiwara and Suzuki (2013). Matrix samples of Koya pyroclastic-flow deposit in Tanega-shima were sampled from base to top with regular level interval. 50-200 volcanic glass shards were selected at each level and measured the major element composition by EPMA. Until now, lower-most level of the pyroclastic-flow deposit at 3 sites and upper-most level at 2 out of 3 sites were measured.
In the lower-most level at every 3 sites, only the high-SiO_2 glass shard was detected. The low-SiO_2 glass shards were detected at upper-most level in 1 site.
The early phase products of the Koya pyroclastic-flow eruption arrived and deposited on Tanega-shima because the same characteristics with the deposits of the main island of south Kyusyu, that is, only high-SiO_2 glass shards are recognized in the lower most level, and low-SiO_2 glass shards were coexisted with high-SiO_2 glass shards in the upper level. Existence or lack of the pyroclastic-flow deposit in Tanega-shima seems to be due to deposited or not rather than arrived or not. It is difficult to explain this existence or lack by flow arrival or not because no topographic barrier exists between caldera and this island, and this island is relatively flat and low altitude.

Keywords: Kikai caldera, Koya pyroclastic flow, volcanic glass, Tanega-shima

