

始良カルデラ大規模火砕活動による噴出物のフッ素, 塩素含有量

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Fluorine and Chlorine Contents in the Products of the Large-Scale
Pyroclastic Activity of Aira Caldera

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Fluorine (F) and chlorine (Cl) have been determined for the products of a series of large-scale pyroclastic eruptions that produced the Aira caldera at the northern end of Kagoshima bay in southern Kyushu. It started with a Plinian pumice eruption (Osumi pumice fall, 98 km³) followed by the Tsumaya pyroclastic flow (13 km³). After a short pose, a violent explosive eruption occurred to form the Ito pyroclastic flow (250 km³) accompanied by the Aira-Tn ash fall (50 km³). Pumice blocks, pumice grains, no welding matrices and welded tuffs sampled from the deposits of the Osumi pumice fall, the Tsumaya pyroclastic flow and the Ito pyroclastic flow are analyzed.

Their F and Cl contents varied in the course of the eruptions. The Osumi pumice fall samples have uniform F and Cl contents and show the highest average values among those deposits. Fluorine contents of the Ito pyroclastic flow samples are distinctly lower than the Osumi pumice samples in order of grain size: fine-grained matrices > coarse-grained matrices > pumice grains > pumice blocks. The Tsumaya pyroclastic samples are divided into two groups according to their F contents. The lower-layer deposits show F contents nearly the same as those of the Osumi pumices, while the higher-layer deposits near to the Ito samples. The variation of F contents from the Osumi pumices to the Ito pyroclastic deposits is thought to be caused by the change of distribution of F between silicate melt and aqueous phases before and after the first Plinian eruption. The variation among the Ito deposits can be explained by the reaction between gases and silicates after the eruption. Chlorine contents in pumices and no welding matrices of both pyroclastic flows show wide range, but the highest values are almost the same as that of the Osumi pumices. Welded tuff samples show the lowest Cl contents and the highest F/Cl ratio. These results can be explained by release of Cl after deposition of the flows.

Key words: fluorine, chlorine, Aira caldera, large-scale pyroclastic deposits, pumice fall deposit

1. はじめに

フッ素, 塩素は, 火成岩中の揮発性成分として水に次いで多く含まれ, 岩石の加熱による脱ガス, 火山ガスと岩石の反応などの過程における挙動が互に異なり, 相互に分別を起こすことがモデル実験などにより示されている (Yoshida, 1963; 吉田, 1975; Yoshida, 1990). 従って, 火山噴出物中の F, Cl の定量は, 噴出時に起こるガス分離過程の理解に寄与するものと思われる. 特に, その発

生, 流動の過程で脱ガスが重要な役割を果たすと考えられている (荒牧, 1957; Aramaki and Yamasaki, 1963) 火砕流堆積物中の F, Cl の挙動を検討することは興味深い. 吉田らは, 浅間山 1783 年 (Yoshida and Tsuchiya, 2004) および 1108 年 (Yoshida and Aoyagi, 2004) の活動で噴出した中間型, 小型火砕流堆積物中の F, Cl を定量し, 同一活動による降下軽石, 溶岩流と比較して, その生成過程を考察した.

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