

Water-soluble components of volcanic ashes discharged from the 2017 eruption at Shinmoedake volcano and the 2018 eruption at Mt. Motoshirane

*Muga Yaguchi¹, Fukuoka Regional Hdqrs., JMA², Kagoshima Meteorol. Office, JMA³, Takeshi Ohba⁴, Nozomi Numanami⁴

1. Meteorological Research Institute, JMA, 2. Fukuoka Regional Headquarters, JMA, 3. Kagoshima Local Meteorological Office, JMA, 4. School of Science, Tokai University

Chemical analysis of water-soluble component adhered on volcanic ash can be used as a means for the evaluation of volcanic activity and study of eruption mechanism. In this presentation, we present the results of chemical analysis of water-soluble components adhered on volcanic ashes discharged from the 2017 eruption at Shinmoedake volcano and 2018 eruption at Mt. Motoshirane.

Shinmoedake volcano of Kirishimayama (southern Kyushu) erupted on 11th to 17th October 2017. Ash samples were sampled on October 11, 12, 14, 15 and 16, and adhered components were analyzed using by ion chromatograph method after pure water extraction. As the result of the analysis, 151~3600mg/kg of Cl⁻ and 17300~26500mg/kg of SO₄²⁻ were detected, and Cl/S molar ratios were ranged from 0.022 to 0.40. A large amount of adherence of soluble components matches the feature of volcanic ash derived from the phreatic eruption. On the other hand, the Cl/S ratios reached up to 0.40 are indicating the occurrence of high-temperature volcanic gas emission. This is because the Cl/S ratio of the water-soluble component of volcanic ashes discharged from the low-temperature activity is not greater than 0.2 (eg., Ossa et al., 1983). During the eruption, the time variation was also observed in the Cl/S molar ratios. On October 11, 12 and 14, Cl/S ratios were 0.31, 0.40 and 0.40, respectively. Cl/S ratios of next two days were obviously smaller than that of first 3days, 0.055 on October 15 and 0.022 on October 16, respectively. And then, eruptive activity stopped at the predawn on October 17. This change is similar to the change in the ash fall amount (reported by AIST, ERI, NIED), indicating that the monitoring of Cl/S ratios of the adhered component of ash fall is effective to the evaluation of the eruptive activity.

Mt. Motoshirane, a part of Kusatsu-Shirane volcano (northern Gunma prefecture), erupted on 23rd January 2018. Water-soluble Cl⁻ and SO₄²⁻ detected were 2640mg/kg and 2530mg/kg, respectively, and Cl/S molar ratio was 2.8. This Cl/S molar ratio is in the range of the volcanic ashes discharged from the 1982 eruption of Kusatsu-Shirane volcano rather than 1976 eruption, which is thought to be a low-temperature activity (Cl/S molar ratio of 1976 ash = 0.002~0.19, 1982 ash = 0.04~2.98; Hirabayashi, 1984).

Additionally, analytical results of chemical and mineral compositions of both volcanic ashes will be reported in this presentation.

Keywords: Shinmoedake volcano, Mt. Motoshirane, volcanic ash, water-soluble components, evaluation of volcanic activity