Mechanisms of infrasonic pulses accompanying the 2018 small phreatic eruption at Iwo-yama volcano, Kirishima Volcanic Complex, Japan

*Dan Muramatsu[1], Takeshi Matsushima[2], Mie Ichihara[3]

1. Dept. Earth Planet. Sci, Graduate school of Science, Kyushu Univ., 2. Institute of Seismology and Volcanology, Faculty of Sciences, Kyushu Univ., 3. Earthquake Research Institute, Univ. of Tokyo

Iwo-yama volcano, part of the Kirishima Volcanic Complex, which is located in southern part of Kyushu Island produced a small phreatic eruption on 19 April 2018. We analyzed infrasonic signals accompanied the eruption. Spectral analysis of the signal shows that the dominant frequency clearly lowered and low-frequency content of the signal significantly intensified about 4 hours after the onset of the eruption, and at the same time, a monitoring camera of JMA confirmed expansion of the vent area. At the time of the dominant frequency change, many high-frequency pulse-like signals were observed. On the other hand, low-frequency N-shape pulses were recorded continuously every ~2 seconds after the frequency change. We named the former as ‘A-type pulse’ and the later as ‘B-type pulse’. A-type pulse was found to be consisted of a low frequency part with a mean dominant frequency of 1.2 Hz and a high frequency part with a mean dominant frequency of 9.0 Hz. B-type pulse has a mean dominant frequency of 1.2 Hz, as same as the low-frequency part of A-type pulse. According to physical models of generation of infrasonic pulse, we interpret that the high-frequency part of A-type pulse is a bursting sound of bubble (or slag) rising in viscous mud, and the low-frequency part of A-type pulse and B-type pulse are produced by bubble vibration in a fluid. It might be possible that vent expansion and viscous mud formation occurred by weakening of medium around the vent and addition of hot water, which resulted in the generation of A-type pulse. Then, a mud-water suspension is formed by adding more water and shifted to the activity of B-type pulse. These results may provide important insights to understand dynamics and mechanisms of phreatic eruption.

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