Pyroclastic Flow Accompanied with an Eruption on June 16, 2018 at Sakurajima Volcano

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At Sakurajima volcano, the explosive eruption has repeated at the summit crater since 1955. The eruption resumed for the first time in 58 years in the Showa crater on the eastern flank of the mountain, and the eruption activity was particularly active from 2009. The eruption activity has been transitioning again from the Showa crater to Minamidake summit crater since 2018. Characteristics of the explosive eruption include ejection of volcanic bombs, generation of shock waves, the release of sudden volcanic ash and gases. Besides, although the frequency is small, the explosive eruption of the Minamidake summit crater and Showa crater produces small pyroclastic flows. The pyroclastic flow is one of the most dangerous phenomena of volcanic eruption, with pyroclastic flow of high temperature and volcanic gas flowing down the flank at high speed, prediction of the pyroclastic flow occurrence is important for volcanic disaster prevention.
Seven pyroclastic flows have been confirmed with the eruption at Minamidake summit crater between 1967 and 1985 (Kamo and Ishihara, 1986). Furthermore, 37 pyroclastic flows have been reported to occur in the Showa crater from 2006 to 2014 with the eruption by the Japan Meteorological Agency. Travel distance of the pyroclastic flows from the Minamidake and Showa craters were less than 2 km. Although it is Sakurajima which continues active eruption activity, pyroclastic flow is minor phenomenon and the mechanism of pyroclastic flow generation in Sakurajima has not been elucidated. In the future, when the eruption activity becomes active, it is necessary to consider the occurrence of a large pyroclastic flow, and it is important to understand the occurrence mechanism of the pyroclastic flow. In this study, we will clarify the characteristics of precursory seismic activity and ground deformation data on the pyroclastic flow occurred in the Mimamidake and Showa craters between 2012 and 2018. In addition, we investigate whether it is possible to predict the scale and travel distance of the pyroclastic flow from the data of the precursory earthquakes and ground deformation.
In the explosive eruption at Minamidake summit crater that occurred on June 16, the volcanic ash reached to 4700 m and the pyroclastic flow went down 1.3 km from the crater in the southwest direction. The expansion of the ground deformation was observed about 18 hours before the occurrence of the eruption. The precursory earthquake sporadically occurred about 1 hour before the eruption, but it was not a clear activity compared to the eruption of the Showa crater. The pictures of the pyroclastic flow shows that the ejected material dropped from the plume flowed down the slope about 1 minute after the eruption started to rise. The pyroclastic flow does not occur simultaneously with the eruption, which has the same characteristics as the pyroclastic flow that occurred during the Minamidake activity period (Kamo and Ishihara, 1986). Amount of ejecta by the eruption is estimated to be 280,000 m3 from the ground deformation data. Not all of the ejecta will be pyroclastic flow. It is necessary to estimate the amount of pyroclastic flow out of the ejecta in order to predict the flow down distance. Estimate the amount of ejecta that became a pyroclastic flow from the calculation of fall volcanic ash using weather radar.

Keywords: Sakurajima volcano, pyroclastic flow

