

Infrasound Associated with Explosive Eruption at Showa Crater of Sakurajima Volcano in 2008

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Showa crater of Sakurajima volcano (E flank of Minami-dake, about 800m height) started eruptive activity in June 2006. This activity started after 60 years dormant since 1946 flank activity in which lava flow occurred, and finished after about two weeks effusive activity. The activity resumed in June 2007 and continued about one month. This activity was also effusive. However, explosive eruption occurred for the first time since 2006 in resumed activity started on February 3, 2008. Since then, explosive eruption occurs four times at Showa crater up to the present (Feb. 12, 09:00). The occurrence of pyroclastic flows is characteristic in 2008 activity. The first explosion (Feb. 3, 10:18) generated small pyroclastic flow, and following two explosion (Feb. 3, 15:54; Feb.6, 11:25) also generated pyroclastic flows which flowed at the distance of 1.0km and 1.3km, respectively.

Japan Meteorological Agency installed four low-frequency microphones around Sakurajima volcano. Those microphones detected infrasound associated with four explosions at Showa crater. Arrival time of the infrasound apparently differs from the cases of summit explosions. We determined the source of the infrasound assuming that acoustic velocity of the air is 340m/s. Estimated sources are located near Showa crater. In the cases of summit explosions, the infrasound sources are determined within the summit crater.

Amplitude of the infrasound is large at the station at E flank while only small infrasound is observed at W flank station, because Showa crater is located E flank of Sakurajima volcano. This observational fact forms a contrast to the case of summit explosion, in which amplitude of infrasound does not have dependence of azimuth. And it indicates the significance to install the infrasonic net around the volcano in order to detect the occurrence of explosion stably.

Preceding phase which precedes main phase about 0.4sec is seen in the infrasonic waveform of explosion at Feb. 6, 11:25. Such preceding phase is not seen in the case of explosions in the air or at the shallow depth, so this phase is direct evidence of occurrence of explosion at some depth from the crater bottom (Sakai et al., 2001). In this explosion, which was associated with pyroclastic flow, small infrasound continued more than one minute after the main phase of infrasound ceased. At Unzen volcano, infrasound continuing a few minutes associated with pyroclastic flow following collapse of lava dome was observed (Yamasato et al., 1993). But in this case, infrasound associated with intense release of plume which continued after explosion seems to be primary.