

## Low-frequency volcanic earthquakes with infrasound at Yakedake volcano and shallow volcanic earthquake activity

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Mt. Yakedake is a volcano in the Hida Mountains, located at the boundary between the Gifu prefecture and the Nagano prefecture, central Japan. Last magmatic eruption was happened about 2,300 years ago. Japan Meteorological Agency (JMA) observed low-frequency earthquakes accompanying infrasound signal, from 9 to 10 August, 2017. In addition, JMA confirmed the fumarolic event at Kurotani crater which emitted the white fumes about 100 m height, using Yakedake North camera had set by the Ministry of Land, Infrastructure and Tourism Hokuriku Regional Development Bureau. By using seismogram analysis, the source location of the low-frequency earthquake and infrasound signals were determined at Kurotani crater. We concluded that the fumarolic events happened at Kurotani crater. Weak white fumarole was occasionally observed from Kurotani crater until October, 2017. A filed survey carried out by JMA from August 29 to September 1 has shown that there are no eruption products around Kurotani crater. There was no particular difference that surface temperatures profile around Hoppo and Yakedake Viewing platform area by the thermal camera observation. However, the fumarole temperature at Hoppo South Slope and Yakedake Viewing platform had slightly increased by comparison with last measurement on July, 2016. Following this fumarolic event, we researched the activity of volcanic earthquakes around the summit area of Mt. Yakedake. As a result, it was revealed that volcanic earthquakes have occurred not only A-type earthquakes, but B-type ones around the summit area. The number of volcanic earthquakes around summit area was about a few times a day. Moreover, the number of volcanic earthquakes increased just before the 9 to 10 August events. Subsequently, to enhance the monitoring system of volcanic earthquakes at Mt. Yakedake, JMA added seismic data observed by the stations installed around the summit by the Disaster Prevention Research Institute, Kyoto University. The number of the observation stations for the summit area of Mt. Yakedake volcano increased, including the instruments set by the Ministry of Land, Infrastructure and Tourism Hokuriku Regional Development Bureau. In order to understand the volcanic activity of Mt. Yakedake, we calculated the hypocenter of volcanic earthquakes occurred around summit area by using the enhanced monitoring system. Most of the hypocenters were determined at about 2 km above sea level just under the summit area of Mt. Yakedake. Since JMA have been determined the hypocenter using the mountainside observation stations, the hypocenters were determined that deeper than the sea level. It is expected that strengthening of the monitoring system of Mt. Yakedake.

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