

Temporal changes in topography, geomagnetism and fumarolic activity around Kurotani crater at Yakedake volcano, Japan

*Takeshi Saito¹, Tensei Hadano², Keiichi Shibuya²

1. Institute of Science, Academic Assembly School of Science and Technology, Shinshu University, 2. Faculty of Science, Shinshu University

Since the latest phreatic eruption in 1962-1963, Yakedake volcano has remained dormant, but fumarolic activity around the summit area has continued steadily during the past hundred years. In the months from July to October 2019, low-frequency earthquakes were observed several times after an absence of about two years, suggesting volcanic activity of Yakedake has been increasing (JMA, 2020). Recently, temperature, chemical, and isotopic compositions of fumarolic gases discharged from the summit fumaroles were ascertained for 2013-2017 (Saito et al., 2019). This time, temporal changes in topography, geomagnetism and fumarolic activity around Kurotani crater, located about 500m northwest of the summit, were reported.

Since August 2017, topography of Kurotani crater had changed gradually, resulting in the change of fumarolic regions and the rise of crater bottom. As a result of field observation on 2 August 2019, six days after the low-frequency earthquake generation, southeastern crater wall was collapsed and the level of the crater bottom rose about 20 m. Small amounts of sand, probably thrown from the crater at the event accompanied with earthquake, deposited at the crater rim. As a result of field observation on 2 November 2019, southern-southeastern crater wall was largely collapsed due to several events accompanied with earthquakes. The rise of the crater bottom reached about 60 m since August 2017. Fumarole on the east wall was appeared in addition to fumaroles at the crater bottom. Because sulfur was crystallized around the fumarolic vent on the east wall, which did not observed before 2 November, SO₂ discharges seems to increase.

New fumarolic area, located about 250 m south from Kurotani crater, was observed on the western slope of the volcano on 2 November. Several weak steams with maximum temperatures of about 46 degrees C were emitted from the region. The appearance of the fumarolic area seems not to be old because vegetation around the steam vents were not destroyed.

As a result of preliminary geomagnetic observation, it was suggested that total magnetic field at the northwest of the summit decreased during the past three years, while no significant changes were observed around the summit. It may indicate thermal demagnetization occurred beneath Kurotani crater and the summit area.

Keywords: Yakedake, phreatic eruption, fumarole, geomagnetism