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## Shallow ultra-micro earthquakes beneath a long dormant Moedake Lava Dome at Kuchinoshima Volcano

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Kuchinoshima Volcano, an active volcano which is composed of several lava domes, is located in northern part of Tokara Islands. Moedake Lava Dome, the newest lava dome among ones within the volcano, was formed at 12 or 13 century (Geshi and Nakano, 2007). They also have estimated the occurrence of some phreatic eruptions and no magmatic eruption after the dome formation. We have seen very weak fumarole activity at craters on the dome for long time. Iguchi et al (2003) estimated the rate of thermal discharge from the lava dome to be 0.1MW. On the other hand, the activities of micro earthquakes in other geothermal fields concerning hot water and/or fumaroles have been studied. We, therefore, have performed the seismic observation in and around Moedake Lava Dome to clarify whether micro earthquakes occur or not inside the lava dome. As the result, we detected that the ultra-micro earthquakes occurred beneath the long dormant lava dome throughout the observation period. Most of these earthquakes are high frequency type that P and S phases are identified on the seismographs. Additionally, the high frequency events followed by weak precursor, and nearly monochromatic events were also observed. In the present study, we mainly focus on the hypocenter distribution of the high-frequency earthquakes in the 90 days from September 17, 2010 through December 15, 2010.

We have installed four seismic stations in and around the lava dome to obtain the continuous seismic data. The triggered data files were made from the continuous data to be used for the analysis. We picked up arrival times of P and S waves and maximum amplitudes at each station on a computer display. Because seismic velocity structures in and around the lava dome had been unknown, we examined 18963 seismic velocity models to search feasible velocity structure. We also performed hypocenter determination with the suitable seismic velocity structure. The estimated extents of the P and S wave velocities are 2.7-2.8 km/s and 1.5-1.6km/s, respectively. The calculations of 106 hypocenters throughout the observation period converged with the velocity model.

The most epicenters of the high-frequency earthquakes locate the limited area of about 150 meters radius, which is very close to the largest summit crater. The depths of the earthquakes were 0.0-0.6km below sea level. We estimated the depth of the largest crater on the lava dome to be about 250m by a simple measurement. The altitude of the upper limit of the hypocenters is about 150m deeper than the estimated crater bottom. The Magnitudes of these events were -0.7 and below. We concluded that ultra-micro earthquakes occur quasi-steadily in the quite limited area below the long dormant lava dome.

Keywords: Kuchinoshima Volcano, Moedake, Lava dome, micro earthquake