Shallow earthquakes in Unzen Volcano inferred from dense seismic observation and resistivity structure

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Unzen volcano is a stratovolcano located in central part of the Shimabara peninsula of Kyushu Island, Japan. During the eruption periods 1991-1995, the seismicity was vigorous at shallow level beneath the Heisein-Shinzan lava dome (Umakoshi et al., 2001), then the number of shallow earthquakes decreased significantly after the eruptions. However, since 2010, the number of shallow earthquakes have been increasing steadily beneath Mt. Fugen and Heiseishinzan lava dome (Japan Metrological Agency (JMA)). The most of the hypocenters were estimated 1 to 2 km below sea level, while importantly, several earthquakes were located above sea level since February 2017. The P-wave arrivals of the earthquakes above sea level show the downward motion at all stations of JMA, MLIT, and Kyushu university. The coda, which shows relatively longer period oscillation, continues approximately 20 to 30 seconds. According to JMA, this type of shallowest earthquakes has occurred 5 times in 2018. Mildon et al. (2016) reported the similar non-DC earthquakes at Krafla volcano, Iceland, and suggested closing clacks model to explain the observation.

In order to explore the shallow earthquake activity beneath Unzen volcano, we established (1) 12 seismic stations around Mt. Fugen and Heisei-Shinzan lava dome in August, 2018. In addition, (2) broad-band magnetotelluric (MT) observation was conducted in October and November, 2018 to estimate subsurface resistivity structure. We recorded telluric fields at 12 sites around Mt. Fugen and Heisei-Shinzen lava dome, and recorded MT fields at two sites at the mid flank of the Unzen volcano. The main purpose of this study is to investigate the relationship between the shallow earthquakes and volcanic fluids beneath Unzen volcano. In particular, the locations and initial motions of the shallowest earthquakes are investigated. We will present the preliminary analysis of the shallow earthquakes obtained from the dense seismic records, and the preliminary resistivity structure.

Keywords: volcanic tectonic earthquake, Unzen Volcano

