Volcanic tremor accompanied by the phreatic eruption at Hakone volcano, 2015

*Yohei Yukutake[1], Ryou Honda[1], Masatake Harada[1], Ryosuke Doke[1], Tatsuhiko Saito[2], Tomotake Ueno[2], Shin'ichi Sakai[3], Yuichi Morita[3]

1.Hot Springs Research Institute of Kanagawa Prefecture, 2.National Research Institute for Earth Science and Disaster Prevention, 3.Earthquake Research Institute,The University of Tokyo

At Hakone volcano, central Japan, a small phreatic eruption was observed at Owakidani geothermal region on 29 June 2015. A few hours before the phreatic eruption, sudden tilt changes of several micro radians were detected by tilt meters and broad band seismometers installed around the Owakidani geothermal region. The tilt changes can be explained by an opening of shallow crack near Owakidani. The result implies that large amount of hydrothermal fluid (hundred thousand m^3) was intruded into a shallow part beneath the Owakidani geothermal region during the tilt changes (Honda et al., 2015). After this event, we also observed volcanic tremors by seismometers near the Owakidani geothermal region. The predominant frequency of the volcanic tremors ranged from 2 to 8 Hz. The volcanic tremors intermittently occurred for two days from 13:03 on 29 June. To determine the source location of volcanic tremor, we used the cross correlation technique of waveform envelope (Obara, 2002). We found that the volcanic tremors occurred at a shallow part near the crater in the Owakidani geothermal region that was formed during the phreatic eruption. We also found that the volcanic tremors were correlated with the occurrence of infrasonic wave. The infrasonic waves were observed after the occurrence of volcanic tremor. From these results, we can suggest that the volcanic tremors were triggered by migration of the hydrothermal fluid that was intruded during the tilt changes, and the infrasonic waves were probably exited by blowout of the hydrothermal fluid.

Keywords: Volcanic tremor, Phreatic eruption, Hakone Volcano

