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Spatio-temporal variations of the volcanic tremors on Kirishima volcano estimated by dense seismic array

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Shinmoedake Volcano, mount Kirishima, Japan, began a series of eruptions on January 19, 2011. We installed 25 seismometers near Shinyu springs located at about 3 km away from the crater. On the other hand 16 seismometers were installed at Hinamori-dai located at about 5 km away from the crater by Nagoya University.

Detection of spatial and temporal variations of volcanic tremors is important for understanding the mechanism of volcanic eruptions. However, short-term temporal variations within a tremor event have not been revealed. Here, we observed change in the seismic ray direction during the volcanic tremor sequence through MUSIC spectrum processing and estimated spatial distribution of the source of volcanic tremors by combination of the two dense seismic arrays. MUSIC spectrum processing was applied to seismograms of a volcanic tremor occurred on February 2, 2011, and its duration was about 40 minutes. Most part of the tremor arrived from Shinmoedake crater. However, at some parts of the tremor sequence the slowness vectors show change in the tremor's source location. One part of the tremor with large slowness and with relatively long duration was generated at a shallow region beneath the crater. Another part of the tremor with short duration was found near Ohnami pond, 3.3 km northeast of the crater. Because of using a constant velocity structure model, accuracy of locations for tremor with small slowness was not enough to discussion relationship between their and volcanic activities. We will estimate distribution of the volcanic tremor source by using more realistic velocity model, and compare other geophysical data in order to understand the eruption activity.

Keywords: Shinmoedake, volcanic tremor