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Clarification of high strain rate around magma chamber

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Ground deformation and volcanic earthquakes are observed, accompanied with rapid accumulation and release of magma. It is considered that high strain rate around magma chamber is generated by the magma accumulation and release. Ground around Aira caldera started to inflate after 1992. The inflation source is located at 10 km beneath center of the Aira caldera, from observations of GPS and leveling measurements. Generation of A-type earthquakes beneath the Minamidake crater increased from 2003 and volcano-tectonic earthquakes at southwest part of Sakurajima and northeast part of Aira caldera also increased. Strain accumulation may become active because the magma is accumulated beneath the Aira caldera.

Seismic experiment was carried in November 2008 in order to research structure and magma supply system of Sakurajima volcano and Aira caldera. Research depth of tomography analysis of velocity structure was until 3-4 km. The structure around magma chamber beneath the Aira caldera was not clear from the seismic experiment. So, we observe natural earthquakes by temporary seismic stations, in order to clarify three-dimensional seismic velocity structure at deeper part of the Aira caldera. 17 temporary stations were installed at Kagoshima and Miyazaki prefectures. And, 3 ocean bottom seismographs were installed in Kagoshima bay. We analyze the velocity structure around the Aira caldera and hypocenter distribution and source mechanism of the natural earthquakes, from data of the temporary stations including permanent stations equipped by Kyoto University, Kagoshima University and NIED.

We estimate three-dimensional seismic velocity structure using data of arrival times of P- and S-waves. And, we clarify distribution of attenuation of seismic amplitudes. So, location and size of magma chamber beneath the Aira caldera is estimated. We determine hypocenter distribution and source mechanisms of earthquakes generated in south Kyusyu and research the condition of strain field and its temporal change around Aira caldera. In this study, we report the temporary seismic observation and distribution of seismic attenuation.

Keywords: Sakurajima volcano, Aira caldera, high strain rate