

Temporal variation of the ACROSS signals during a period from January to August, 2015 in Sakurajima volcano, Japan.

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Quantitative monitoring of magma transport process is essentially important for understanding the volcanic process and prediction of volcanic eruptions. To realize this monitoring, an active monitoring system using a vibration source called ACROSS has been operated in Sakurajima Volcano since September 2012 (Yamaoka et al., 2014; Miyamachi et al., 2013; 2014).

From our previous observational studies, we obviously found that the amplitude and travel times of the daily transfer functions (the ACROSS signal) vary temporally. In particular Maeda et al. (2015) revealed that the amplitude of the ACROSS signals in the later phases became small in several hours before and after explosive eruptions. In this report, we show a long-term temporal change for the ACROSS signals observed with the remarkable volcanic activity that occurred in Sakurajima volcano on August 15, 2015.

DATA

Our ACROSS system is composed of two vibrators: one vibrator (SKR1) with a signal frequency range of 7.510Hz +/- 2.50Hz and the other (SKR2) with the range of 12.505Hz +/- 2.50Hz. The seismic signals from the ACROSS sources are routinely monitored with more than 20 permanent and 5 temporal seismic stations in and around Sakurajima volcano. The signals recorded at the seismic stations are deconvoluted with the ACROSS source function to obtain the transfer function between the source and the receivers.

The ACROSS system was continuously operated until 18 August, 2015 after five month failure of inverter system. We successfully replace the broken inverter with a normal one by managing transferring inverters from one source to another. The fixed ACROSS system started operation at the beginning of January 2015, but the operation was suspended on 18 August, 2015 because of the signal contamination to a monitoring seismic station for the volcano. We use the data in 2015 to check the temporal change of transfer functions between the ACROSS source and the seismic stations in Sakurajima island.

RESULTS

We calculated the daily transfer functions for each station by every 1 day stacked data during a period of January to August 2015. Transfer functions in Sakurajima volcano indicate large temporal variation especially in later phase part comparing to the other site such as Awaji or Tokai area where ACROSS system is being operated. In many of the transfer function connecting between the ACROSS source and the stations remarkable change can be seen at the end of July, 2015, though causal relationship to the volcanic event on 15 August is not clear. We also need to make a quantitative investigation on the meteorological effect to the transfer functions.

Reference

Yamaoka et al. (2014) Earth Planets, Space, Doi:10.1186/1880-5981-66-32
Maeda et al. (2015) Geophys. Res. Lett., Doi: 10.1002/2015GL064351

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