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桜島火山おけるアクロスを用いた能動的モニタリング -観測報告 2 -
Active monitoring by using ACROSS in Sakurajima volcano - observation report 2 -

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In March, 2012, we installed the ACROSS (Accurately Controlled Routinely Operated Signal System) composed of two vibrators at the western foot of active Sakurajima volcano (Yamaoka et al., 2012).

The first test operation was carried out during a period from June 12th from September 17th, 2012. The objectives of this operation were to construct the remote monitoring and control manipulation system, and to ascertain whether the seismic stations, belonging to JMA, Hinet, Kyoto Univ. and Kagoshima Univ., located in and around Sakurajima volcano could detect the ACROSS signals. We configured one vibrator with a constant signal frequency of 10.01Hz and the other with a signal frequency range of 12.50Hz +/- 2.50Hz in a linear sweep interval of 50 sec. We found that the signals successfully propagated through the volcanic area: the transfer functions at the seismic stations located in Sakurajima island can be clearly estimated by stacking seismic data during three to five days. On the other hand, the stations around the Aira caldera need to the seven days stacked data to obtain the transfer functions.

On September 19th, we have started the second test operation under synchronized control of two vibrators: one vibrator with a signal frequency range of 7.510Hz +/- 2.50Hz and the other with the range of 12.505Hz +/- 2.50Hz. We also deployed four temporary seismic stations so as to surround the summits of Sakurajima volcano. Our purposes in this operation were to estimate a transfer function in a wide signal range from 5Hz to 15Hz at each station, and to detect temporal change of the function.

At first, we estimated the daily transfer functions for each station by every 5 days stacked data during a whole period of the operation. We simply calculate the mean transfer function for each station from the estimated daily transfer functions, and evaluated the difference (DTF) between the mean transfer function and the daily transfer functions. The DTF in the early part of the daily transfer function, which is corresponding to P wave arrivals, is found to be generally small. On the other hand, the DTF in the later phases is large. We also found that the DFT at some stations clearly and temporally changes. We supposed that the phases with a large DTF possibly indicate the temporal change of the transfer function. To verify the temporal change, we evaluated the travel time change of the phases with a large DTF by applying the cross-correlation procedure. In the presentation, we will report the observation results in detail.

キーワード: 桜島, アクロス, 火山, 伝達関数
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