

Intense Swarm Activity in the Vicinity of the Sakurajima Volcano, Kyushu, Japan, in August 2015, detected by the Matched Filter Method.

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Seismic activity in the vicinity of the Sakurajima Volcano, Kyushu, Japan was analyzed by using the Matched Filter Method (MFM). This swarm activity started on August 2015 and lasted for two days. Other authors reported that this activity was caused by a magma intrusion beneath the Sakurajima volcano by analyzing the crustal deformation data. In our analysis, we implemented MFM as a pseudo-automatic hypocenter determination system that enables to locate earthquakes one by one. Our interest is if the MFM is a useful tool for immediate grasp of an ongoing intense seismic activity.

In the MFM analysis, selection of the template earthquakes is important since the spatial distance and magnitude difference among the template earthquakes affect the detectivity of earthquakes. For this purpose, we separately implemented the conventional event detection algorithm using STA/LTA to detect possible template earthquake in order to configure a set of template earthquakes. In this stage, we set STA/LAT to a pretty large value than usual so that we can only detect those events that have rather higher S/N ratio. Then we manually inspect the hypocenter of a possible candidate of a template event to add it as a new member of the template earthquakes. When we obtained a new template, all the continuous record in the test period (48 hours starting from 00:00 August 15) are scanned by the new template to detect new earthquakes. We repeated this procedure during 4 hours from 9:00 to 13:00, August 15 to select template earthquakes. We finally selected 56 template earthquakes in this manner.

During the test period of 48 hours, about 1,900 earthquakes are detected and located with 56 templates. Automatically located hypocenters by MFM and manually inspected ones by JMA (Japan Meteorological Agency) indicates similar hypocenter distribution, and therefore the MFM possibly provide a useful information to understand the outline of the activity in the early stage. Although the manually inspected catalogue data is essential for the precise evaluation of a seismic activity, we suppose MFM is one of the powerful tools for an immediate grasp of the ongoing intense swarm activity.

Keywords: Sakurajima volcano, swarm activity, Matched Filter Method, pseudo-automatic hypocenter locating system

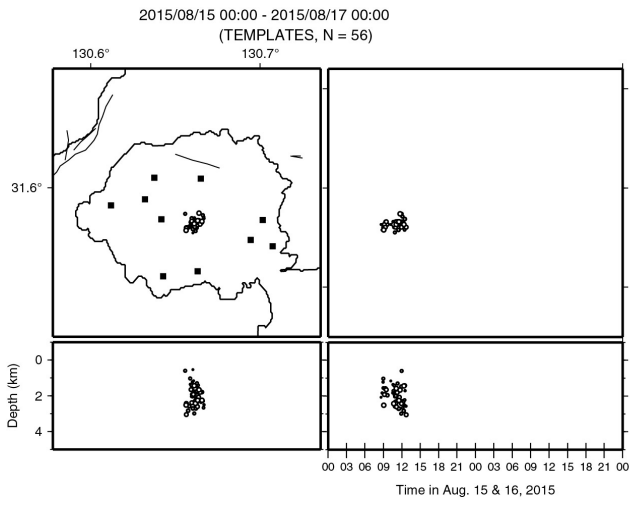


Fig.1

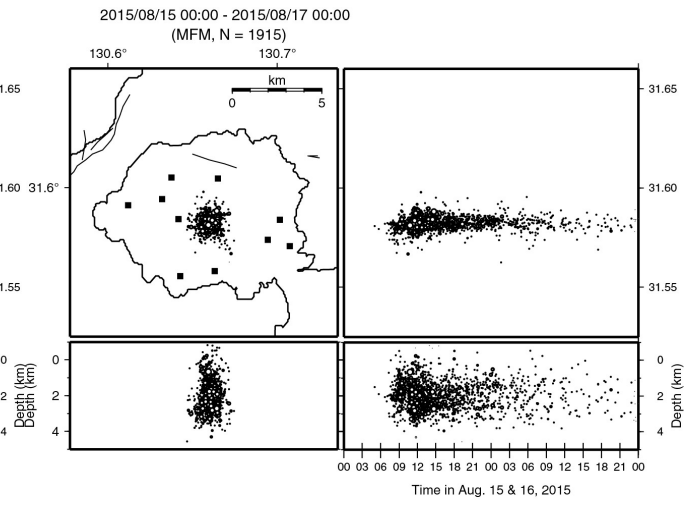


Fig.2