

Characteristics of source process on four earthquakes during the earthquake swarm off the east of Izu Peninsula in 2006

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Earthquake swarms have occurred off the east coast of Izu Peninsula associated with the intrusion of volcanic fluids along tensile faults (Okada and Yamamoto, 1991; Aoki et al. 1999). As earthquake swarms are likely to occur at the tip of dyke, their hypocenters in space and time reflect the position and the migration of volcanic fluids (Hayashi and Morita, 2003). Therefore, earthquake swarms are important as an indicator of volcanic process. In addition, we have to note that they have strike-slip focal mechanisms (Okada and Yamamoto, 1991; Hayashi and Morita, 2003), suggesting that they are caused by the stress fluctuation due to the intrusion of volcanic fluids and would not be directly triggered by the tensile rupture.

In this study we analyzed K-net waveforms and estimated source processes of four earthquakes (M5.8, M4.5A, M4.5B, M4.2) that occurred off the east of Izu Peninsula in April 2006. We used waveforms of three earthquakes (M3.5 –4.0) as Empirical Green' s functions (EGFs).

We found that the largest analyzed earthquake with M5.8 included two subevents followed by a couple of smaller ruptures. The smallest earthquake with M4.2 consisted a single moment release in time. Two earthquakes with M4.5 also had two subevents but they showed different characteristics. One of them, which we call M4.5A, included two subevents and their ratio of seismic moments were 5 to 1. On the other hand, two subevents of the other one (M4.5B) had almost the same seismic moments. The difference of the two earthquakes would be associated with locations of hypocenters relative to the previous earthquake swarm. The earthquake M4.5A was located close to the swarm activity in 1998, which would have created a fractured area and caused the perturbation of stress and strength (Hayashi and Morita, 2003). Further detailed analysis will be needed in the future, including the spatial slip distribution with volumetric change.

Keywords: east off Izu Peninsula, earthquake swarm, source process