Time evolution of the 2016 Kumamoto Earthquake I

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Mjma6.5 event was occurred on the Northeast part of the Hinagu fault zone on 14 April 2016. Aftter about 28 hours, Mjma 7.3 event occurred on the Futagawa fault zone and triggered seismic activities happened at the Northeast part of the Mt. Aso and near Beppu city. From the spreading source region and its magnitudes, it seemed that the first Mjma6.5 event was foreshock and the Mjma 7.3 event was main shock. However, time evolution of the sequence must be discussed to reveal the relation of the two events.

In this study, we detected after shocks events using the Matched-filter technique (Gibbons and Ringdal, 2006; Shelly et al., 2007) in the continuous records. We mainly selected the events that occurred deeper part of the fault zones as templates and use the temporal observation data including the network just above the aftershock region. Using that datasets, we could distinguish among the events that were close to each other in time and space.

We obtained the results as follows. First, the number of the detected events was higher than the regions surrounded by the foreshock and the aftershock rather than other region. In addition, activity rates of the detected events in the inner region were higher than that of outer region. These suggested that foreshock activities at the deeper part of the fault zones was affected to the occurrence of the main shock. Second, numbers of detected events that using the templates between the foreshock and the main shock was decrease after the main shock. We considered two reasons as follows. One is the effect of the migration of active area. The other is that the stress field and/or structures surrounding fault zones were disturbed by the main shock.

In addition, we investigated the influence to the non-volcanic tremor occurred at the southwestern part of the Hinagu fault zone (Miyazaki et al., 2015; Chao and Obara, 2016). We found that tremors were activated after the large events. Long term activity rates were seems to be unchanged before the 2016 Kumamoto earthquake. Activities at the seismogenic zone above the tremor sources were relatively lower than that of other regions. These suggested that magnitude of the direct influences from the 2016 Kumamoto earthquakes was small. However, we need careful observation to reveal the effect to the whole Hinagu fault zone.

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