

Aftershock observation and their source parameter analysis of the 2016 Gyeongju earthquake

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The 12 September 2016 Gyeongju earthquake (5.8) occurring at 11:32:54 (UTC) is the largest instrumentally recorded event in the southern Korean Peninsula and it is followed by thousands of aftershocks. For monitoring the aftershocks, a temporary seismic network of 27 stations was installed in a few days and operated for several months. From regional seismic networks and the temporary network, we detected P/S phase arrival-times and associated them by a series of automatic procedures. With a 1-D velocity structure and the associated arrival times, locations of the aftershocks were initially determined by an iterative linear method. To observe the detailed pattern of the hypocenters, initial hypocenters were relocated by the double difference method using the waveform cross-correlation. With the hypocenter distribution, the focal mechanism analysis of specific events was then operated by measuring the first P-wave motions. Our detection algorithm observed over a thousand events and their locations are mainly clustered between two regional fault lines. Our result indicates that the distribution of the aftershocks and the fault plane solutions obtained from the focal mechanism analysis are not matching with the surface traces of two regional faults, suggesting a complex geometry of faulting system beneath the Gyeongju area can exist.

Keywords: Gyeongju earthquake, aftershock monitoring, Yangsan Fault system