

Hypocenter distribution and focal mechanisms in the northern part of aftershock zone of the 2004 Mid-Niigata Prefecture Earthquake

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We have investigated the spatial distribution of aftershocks and their focal mechanisms of the 2004 Mid Niigata Prefecture Earthquake that took place on 23 October 2004 in central Japan. We used the data from our temporary network and those from the JMA catalog. The temporary observation was carried out in the period from November 7 to December 13 by installing seismometers at 4 stations in the northernmost part of aftershock zone. A large aftershock ($M = 5.9$) occurred just beneath our temporary network on November 8. Since this event was accompanied by a large number of aftershocks, the data from the temporary network is quite useful to identify the fault plane of this large aftershock from the hypocenter distribution.

We determined aftershock hypocenters in the period from October 23 to December 10 by using a joint hypocenter determination (JHD) method. We employed data from 23 stations around the aftershock zone as well as the 4 temporary stations. By referring to the previous studies, we assign a velocity structure with slower surface layers to the stations located to the northwest of the aftershock zone. Due to the effect of both this velocity structure and the station corrections determined in the process of JHD location, the obtained aftershock distribution is fairly consistent with the previous works that takes into account the effect of heterogeneous crustal structure. In the aftershock zone of the $M = 5.9$ earthquake, the hypocenters are aligned on a plane dipping northwestward. This plane corresponds to one the nodal planes of focal mechanism of the earthquake.

More than 60 % of aftershocks whose focal mechanisms could be determined are reverse fault type with WNW-ESE trending P-axis. The earthquakes of other types except normal faulting also have similar trend that is in harmony with the regional stress field. Closer look reveals slight but systematic rotation of the trend of P-axes from northern part to southern part of aftershock zone. A group of aftershocks located in the northwestern part of aftershock zone has P-axes striking NNW-SSE. The earthquakes in the aftershock zone of the $M = 5.9$ event have P-axes pointing E-W. Thus the events in this northernmost area are characterized by shallower focal depths and anticlockwise rotation of P-axes compared to the aftershocks in the main fault zone. The cause of this deviation may be related to the geological structure and processes, but require further investigation.