茨城県北部・いわき地域における誘発地震発生域の断層面分布

Various fault geometries in the source regions of normal faulting sequences induced by the 2011 M9.0 Tohoku-Oki

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We relocated numerous earthquakes in the source regions of normal faulting sequences induced by the 2011 M9.0 Tohoku-Oki, using seismic waveforms retrieved from a dense seismic network deployed after the Tohoku-Oki earthquake. The seismic network has consisted of around 60 portable stations equipped with short-period sensors. Initially, we detected earthquakes from continuous waveforms from July 2011 to June 2014, by applying an automatic detection algorithm. Then, we calculated differential arrival times obtained by the automatically picked and waveform correlation method. We obtained more accurate differential arrival times that contained 56 million P wave observations and 51 million S wave observations for use in the double difference relocation. Applying a double-difference algorithm to the arrival data-set, we succeeded to relocate ~200000 earthquakes with high accuracy. We found that most earthquakes show planar alignments, and the fault distribution varies along the source region. At the northern part, many tiny fault planes are distributed like a flower structure. In contrast, a sharp fault well develops in the central portion. The thinnest width of the sharp fault is close to only 100 m. At the southern part, there are some conjugate fault systems. These spatial variations of fault geometries in the source region of normal faulting sequence reflect fault evolutions.

