

Aftershock distribution and crustal structure in and around northern focal area of the 2008 Iwate-Miyagi Nairiku Earthquake

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On June 14, 2008, a large earthquake (M_{JMA} 7.2) occurred in the central part of northern Honshu (Iwate prefecture), Japan. Northern part of the focal area is close to the Dedana fault, which is a southern part of the western marginal faults of Kitakami Lowland. Seismic reflection/refraction experiments were conducted across the Dedana fault in 2006 and 2007 (Abe et al., 2008; Saito et al., 2008). Deeper extension of the west dipping listric faults were well demonstrated on seismic reflection section. To reveal the relationship between an active fault system and aftershock distributions is important to improve the way of assess long-term behavior of active faults. We conducted a highly dense 40-km-long seismic array observation across the northern focal area of the 2008 Iwate-Miyagi Nairiku Earthquake during an eight-day period from 18:00 on July 4. Two hundred seventy-seven seismic stations were installed on a survey line in the east-west direction with about 150 m spacing. To improve the accuracy of hypocenter determination, we also deployed 5 seismic stations around the survey line. We used two types of off-line recorders. One is LS8200SD (Kurashimo et al., 2006), and the other is JGI's MS2000. During the seismic array observation, Japan Meteorological Agency (JMA) determined 163 events within 7km of our survey line. We obtained high signal-to-noise ratio data. Prominent late arrivals, probably reflected waves from the deeper part of the crust can be recognized on the record sections. Arrival times of earthquakes were used in a joint inversion for earthquake locations and 3-D velocity structure. To obtain a detailed and clear image of crustal structure, the seismic reflection technique was also applied. Reflection image shows the reflector is located at a depth of about 13 km. The distribution of aftershock shows a concentration on a plane dipping about 40 degrees to the west beneath the eastern margin of the Ou backbone range. The zone of aftershock concentration can be correlated to the known range bounding fault inferred from seismic profiling and does not coincide with the known active reverse fault (the Dedana fault). Based on GPS measurements, the upper edge of the coseismic fault is located several kilometers west of the surface trace of the Dedana fault (Ohta et al., 2008). These results indicate that the 2008 Iwate-Miyagi Nairiku earthquake occurred along the range bounding fault which located at the eastern margin of the Ou backbone range.