

Seismic profiles along the Iwai River in the source area of the 2008 Iwate-Miyagi Nairiku Earthquake

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The Iwate-Miyagi Nairiku earthquake in 2008 (Mj 7.2) occurred along the eastern flank of the backbone range of Northern Honshu, Japan. The earthquake generated the surface ruptures (e.g. Ishiyama et al., 2008; Doi et al, 2008; Kaneda et al., 2008). To reveal the relationship between the seismogenic source fault and the surface ruptures, seismic reflection and refraction profiling were undertaken in the central part of the focal area for an 11.5-km-long seismic line along the River Iwaigawa. Seismic data were acquired using two medium size vibrator trucks. The sweep signals (8-80Hz; reflection profiling, 8-40Hz; refraction profiling) were recorded with 10 Hz geophones deployed at 10 m and 20 m intervals, digital telemetry system (JGI G-DAPS4) and off-line recorder (JGI MS2000), individually. The seismic data were processed using conventional CMP-reflection methods and refraction tomography (Zelt & Barton, 1998). The resultant depth converted seismic sections portray the Miocene normal fault system and younger reverse faults. At the eastern part of the seismic line, Cretaceous granitic rock is cropping out as a horst bounded by east and west dipping normal faults. Surface ruptures were observed along the west-dipping Miocene normal fault, suggesting the fault reactivation by tectonic inversion. Another important feature of the seismic section is existence of reverse faults along the boundary between Backbone range and hills. In this area, surface ruptures were reported by Doi et al. (2008). It is highly probable that the newly funded range boundary fault played important roll during the earthquake event. It is estimated that the range boundary faults and west-dipping Miocene normal faults were displaced during the earthquake and produced the diverged pattern of surface ruptures in a wider zone.