

Seismic surveys in the ruptured area of the 2011 Tohoku earthquake

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We have conducted seismic surveys in the ruptured area of the 2011 Tohoku earthquake off Miyagi prefecture in 2011 and 2013 using JAMSTEC's R/V Kairei. Three multi-channel reflection seismic (MCS) surveys were conducted in 2011 with R/V Kairei's 7800 inch³ tuned air gun array and ~6 km long streamer cable. The MCS profiles along 14 E-W (dip) lines and two N-S (strike) lines were acquired during these surveys. Another seismic survey was carried out in 2013 around the JFAST drill site along one dip line and two strike lines. Time migrated sections demonstrated characteristic structure in the Japan Trench subduction zone; the Pacific plate deformed by normal faults (horst and graben structure), frontal prism with seismically transparent or chaotic feature, strong landward dipping reflections corresponding to the backstop interface, "deep sea terrace" in the upper landward trench slope covered with younger sediments mainly deformed with normal faults. Our survey area covers ~150 km in the trench strike direction around the epicenter area, which is rather small compared with the entire rupture zone (400 ? 500 km in the strike direction) of the Tohoku earthquake, however the structure is considerably variable from south to north. We have selected 6 dip lines, including the JFAST dip line, to apply pre-stack depth migration (PSDM). The PSDM sections provide higher quality profiles and interval velocity models in depth domain which are suitable for understanding the structural framework of the Japan Trench subduction zone. In 2013 survey, we also used four ocean bottom seismographs (OBSs) in addition to the MCS system. The P to S converted wave was clearly observed in the horizontal component seismograms, and the V_p/V_s in the sediment layer around the JFAST drill site was estimated at >4.5 .