

High resolution seismic imaging in the trench axis area of the Japan trench off Miyagi

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Since the great Tohoku earthquake occurred, we have conducted multichannel seismic surveys using tuned air gun array with large volume (7800 inch³) and long (~6 km) streamer cable to image the ruptured area in the landward slope of the Japan trench. Obtained seismic sections successfully delineated the structural characteristic. We also carried out a high resolution seismic survey using a cluster gun with smaller volume (320 inch³) and shorter (~1.3 km) streamer cable in the vicinity of the trench axis area. The survey was a part of the site survey for IODP Japan Trench Fast Earthquake Drilling Project, thus a 2-D grid lines with 500 m line spacing were planned to determine the best location of the drilling site. Due to the higher frequency contents of the source and denser spacing of hydrophones, we could obtain finer scale of the structural image. In the trench axis area, pelagic/hemiplegic sediments were folded and cut by reverse faults. A seaward dipping reflector, gently connecting the edge of the horst and the top of the graben, is imaged in the migrated section. We could obtain high resolution seismic images in the Japan trench area, despite the great depth of the seafloor, small volume of the source and short maximum offset of the streamer cable. However, any continuous reflectors are not imaged inside of the frontal prism, seaward of the "backstop" interface. This observation suggests that significant lithological boundary or well developed fault does not exist in the frontal prism of the Japan Trench.

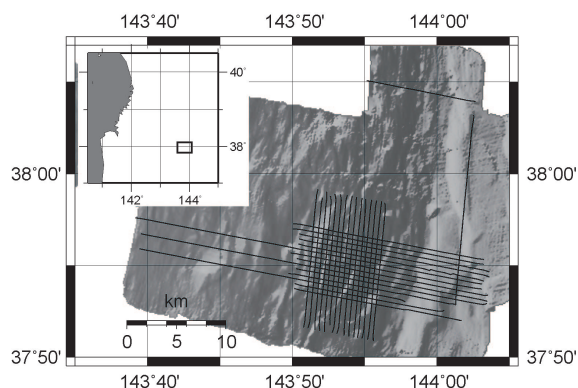


Fig. Survey lines of the high resolution MCS carried out during the KY11-E05 cruise.