Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS02-P03 Room:Convention Hall Time:May 25 18:15-19:30

Structural characteristics observed on high resolution seismic profiles in the northern Japan Trench axis region

NAKAMURA, Yasuyuki[1*] ; KODAIRA, Shuichi[1] ; YAMASHITA, Mikiya[1] ; MIURA, Seiichi[1] ; FUJIE, Gou[1] ; IWAMARU, Hikaru[1]

[1]Japan Agency for Marine-Earth Science and Technology

The Japan Trench axis area has been intensively investigated since the 2011 Tohoku earthquake because the large slip reached to the vicinity of the trench axis. We have conducted three high resolution seismic cruises in the northern part of the Japan Trench axis region. The trench area between 38 - 40.5 N was covered by 94 E-W seismic lines with 2 - 6 km line interval. A 1200 m-long streamer cable with 192 channel receivers and a cluster gun array with volume of 320 - 380 inch^3 were used for these surveys. Post-stack time migrated sections provide detailed image of sediments above the subducting Pacific plate and its deformation by the bending-related normal faults on the outer trench slope. Thrust faults and possible slope failures are observed landward of the trench axis, beneath the lower most landward trench slope. The deformation style of the sediments in the trench axis shows variation along the trench strike. To the south of the survey area in 38 - 39 N, imbricate thrust-and-fold packages is observed but limited within the vicinity of the trench axis, which could be related to the interaction between the frontal prism toe and horst-graben structure. To the north around 40 - 40.5 N, frontal thrusts and imbricate structure are clearly observed on the seismic profiles through ˜10 - 15 km landward of the trench axis. Around 39.5 N, the trench inner slope is very steep. It is suggested that slope failures have occurred in this area. The trench axis is filled by slump deposits and debris with chaotic acoustic characteristics, which is similar with that in the seaward portion of the frontal prism. Seismic profiles on the outer trench slope show the variation on the thickness of the incoming sediments along the trench strike. It is thick, ˜500 ms, in the northern part of the survey area around 40 - 40.5 N, and it is ˜250 ms in the southern part around 38 N. The thickness is varied in the area between 38.5 - 39.5 N, and is very thin at 39.5 N. Sediments on the trench outer slope basically conformably cover the igneous basement of the Pacific plate and they were deformed by the bending-related normal faults. These normal faults basically coincide with faults identified on the bathymetric map. Graben fill sediments which onlap the original incoming sediments are also clearly observed on the seismic profiles in the outer trench slope. These graben fill sediments have been deposited in several isolated basins. The graben fill sediments could cause underestimation of the fault throw if estimated from bathymetry data, because they mask the throw of the faults located near the depocenter. Similar onlap fill sediments are also observed in a few places in the trench axis.

Keywords: Japan Trench, seismic imaging, incoming sediments, frontal thrust faults, bending-related normal faults