

NT15-07 Cruise Summary

1. Cruise Information

- Cruise ID: NT15-07
- Name of vessel: Natsushima
- Title of the cruise: Investigation of earthquake recurrence and evaluation of stability of submarine bed off Tohoku
- Chief scientist [Affiliation]: Toshiya Kanamatsu [CEAT JAMSTEC]
- Representative of the Science Party [Affiliation]: Shuichi Kodaira [CEAT JAMSTEC]
- Title of proposal
- Proposal1 representative [affiliation]: Shuichi Kodaira [CEAT JAMSTEC]
- title: 「Mega-earthquake and Tsunami in subduction trench: geological and geophysical researches for understanding of their mechanism
- Proposal2 representative [affiliation]: Shuro Yoshikawa [MAT]
- title: 「Evaluation of bed stability estimated by shear strength of soils」
- Cruise period: Apr. 15th 2015 to Apr. 26th 2015 (12days)
- Ports of departure / call / arrival Sendai/Sendai/Sumijyu Yokosuka
- Research area: off Tohoku
- Research map **Fig. 1**

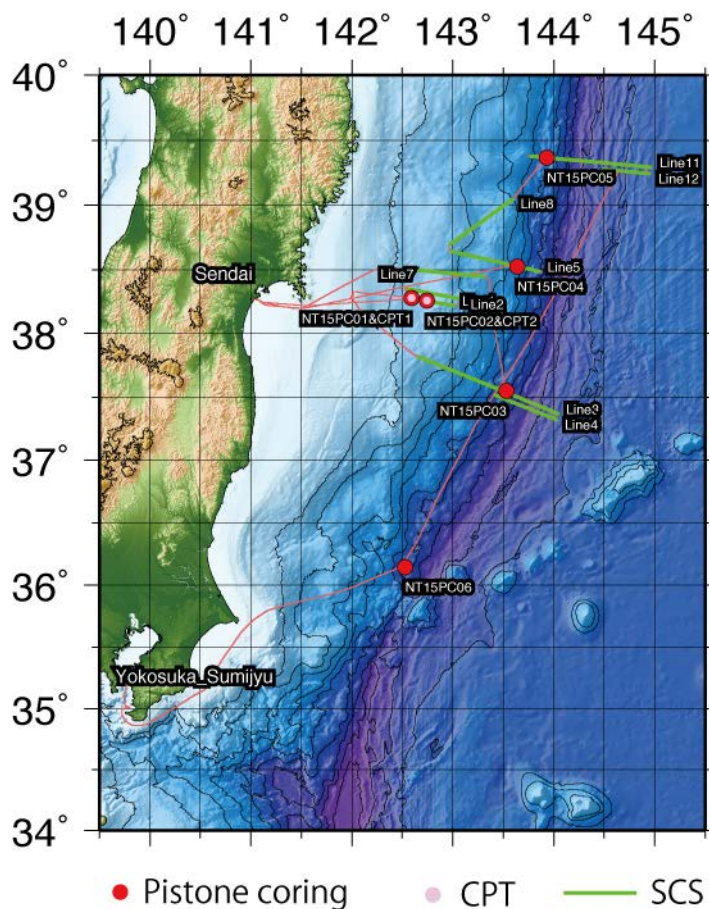


Fig. 1 Ship track and working positions of NT15-07

2. Objectives and Overview of Observations

2-1. Objectives

Paleoseismology:

Mid slope terrace (MST), is developed between an upper slope and a lower slope with gentle slope of Tohoku. The main objective was to begin to understand the sedimentation in this area. MST contains many small basins, which may capture mass transport deposits induced by earthquakes from an up-slope. An investigation on such surface sediment in these basins, therefore, will provide an opportunity for determining recurrence of earthquakes in Tohoku. In order to characterize the sediment deposited in these basins, we plan a piston coring campaign within the planed working area. In the meantime, to understand a long depositional history and search any structural evidences for past earthquakes under seafloor, we also plan to conduct Single Channel Seismic observation (SCS) from forearc basins to trench axis across MST.

Cone Penetration Testing:

An examination of the shear strength of submarine deposits is important for research on seafloor stability, and for generation of submarine landslide and turbidity current. In addition, the shear strength is essential information for construction of submarine platform that operates extraction of submarine resource. To examine the strength in broad offshore area, development of a device that can easily measure the in-situ shear strength of the deposits is necessary. In this cruise, cone penetration testing (CPT) had conducted in 16 April 2015 at two sites, to examine data of the CPT system with a pressure gauge and an acceleration sensor that measure the condition of the penetration into the seafloor, and to advance the operation of the system on deep seafloor. Furthermore, to calibrate the CPT data, sediment cores were sampled in the same sites.

2-2. Observations

NT15-07 was planed for conducting two themes above mentioned from 15th to 26th Apr. (Sendai-Yokosuka). Unfortunately our cruise was terminated on 15th, 20th, and 21st for waiting on weather. But two CPT, seven Piston coring and nine lines of SCS observations could be completed within our ship time (Fig. 1). Our achievements are summarized as followings. 1) CPT operations (Fig. 2) are conducted to obtain geomechanical data in two sites with repeating penetrations, and recovered two piston cores were recovered from the same sites to measure shear strengths of sediment directly onboard. 2) Three cores were recovered from MST, and one core from the outer ridge. Intercalating of frequent sandy layers, which are probably evidences for paleo-tsunami or paleo-earthquakes, and a few tephra layers are observed (Fig. 3). 3) SCS observations recognized unique underground strata-structures in the forearc basins and on the subducting seafloor. Sub-bottom image of range of ca. 1000 ms TWT are acquired (Fig. 4).

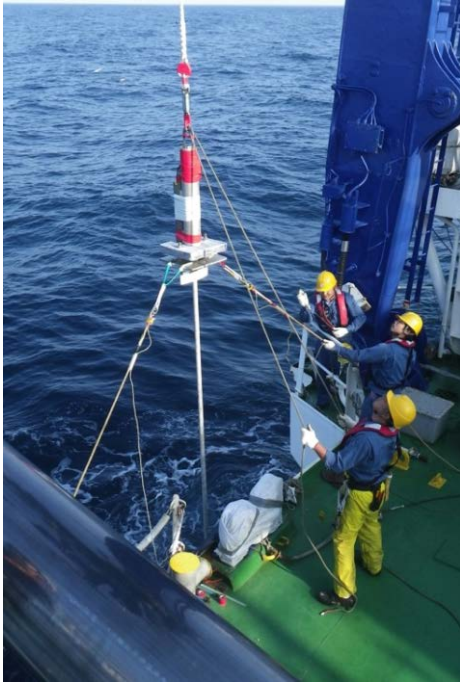


Fig. 2 CPT deployment



Fig. 3 Core photo of PC03 taken from the mid-slope terrace. Note frequent occurrence of sand layer, which could be derived as seismo-turbidite.

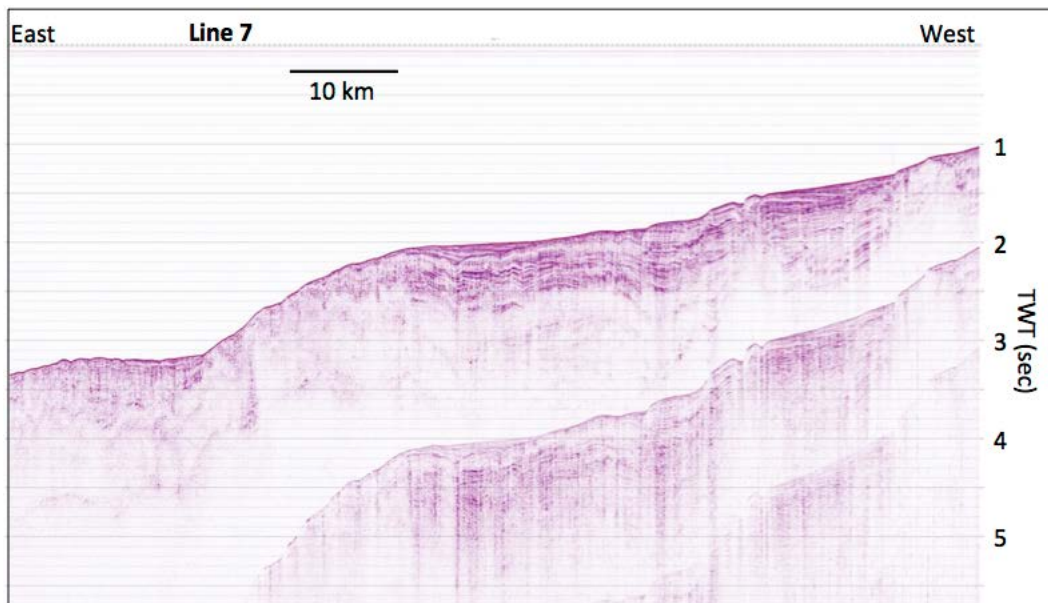


Fig. 4 SCS image of Line 7