

Cruise Summary

1. Cruise Information

Cruise ID: MR15-E01 Leg3

Name of vessel: R/V MIRAI

Title of the cruise: Cross-ministerial Strategic Innovation Promotion Program (SIP), Next-generation technology for ocean resources exploration (ZIPANG in ocean), “Site survey for scientific drilling using portable multi-channel seismic reflection survey system”

Chief scientist: Koichi IJIMA [Japan Agency for Marine-Earth Science and Technology; JAMSTEC]

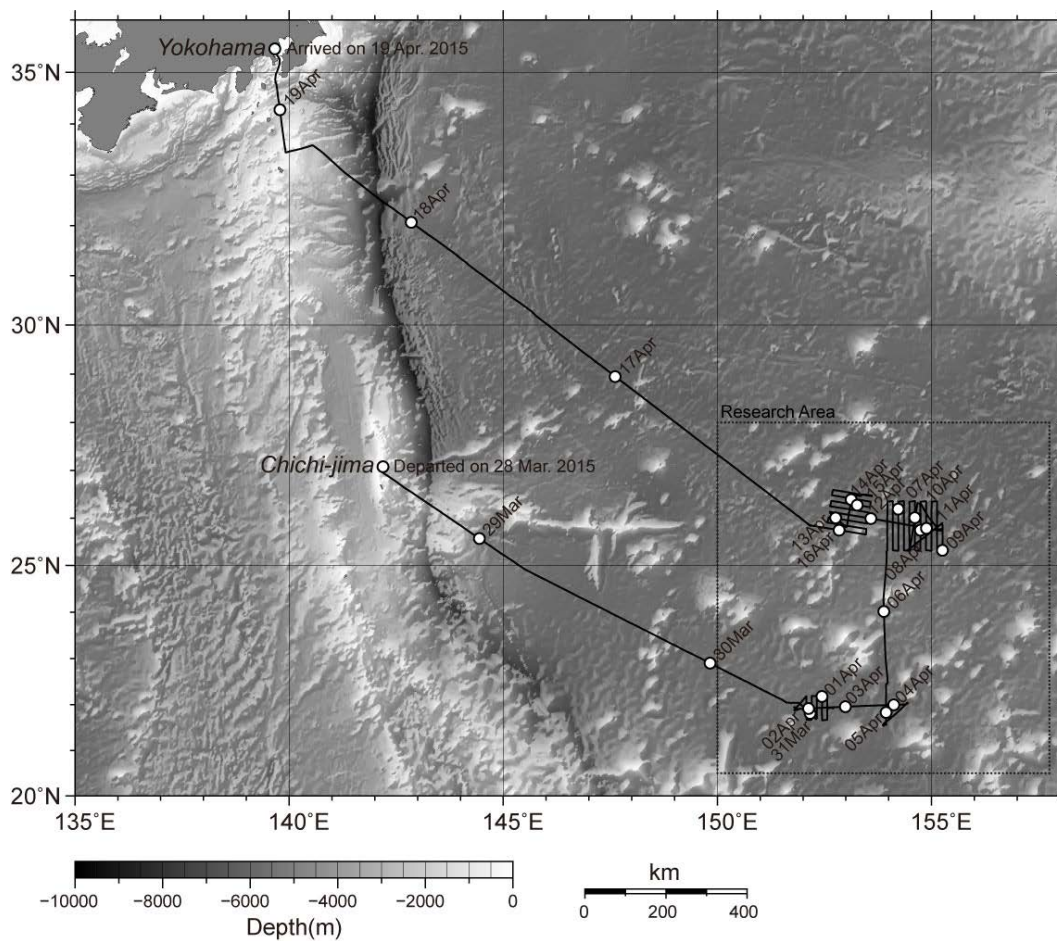
Representative of the Science Party: Katsuhiko SUZUKI [JAMSTEC]

Cruise period: 28 March – 18 April 2015

Ports of departure / arrival: Chichi-jima / Yokohama

Research area: Around Minami-torishima island

Cruise track:



2. Overview of the Observation

Background and objectives:

Deep-sea mud that is extremely enriched in rare-earth elements and yttrium (together called REY-rich mud) around Minami-torishima island was discovered in cruise KR13-02. Since that, many piston coring, sub-bottom profiling (SBP) and multi-beam echo sounder (MBES) bathymetric survey has been conducted on the basis of fundamental objective to investigate the features, distribution and generation of REY-rich mud.

In the past cruises, 20 m class piston coring penetration stopped maximum around 13m. On the other hand, past drilling cores near Minami-torishima island, Deep Sea Drilling Program (DSDP) site 198 and Ocean Drilling Program (ODP) site 800, did not recovered enough sediment to investigate REY-rich mud generation. That is, we have never seen deeper part of continuous sediment beneath 13 meters below sea floor (mbsf).

Then we make a simple drilling proposal to recover whole sediment above acoustic basement supposed to be chert or porcelanite according to sub-bottom profiling described in Nakamura et al. (2016). They distinguished three acoustic facies in the sub-bottom profiling: opaque (O), transparent (T), and layered (L), and they revealed that T-type facies represents REY-rich mud. We selected 3 sites to drill; St.1: T-type, extremely REY-rich mud existing, St.2: L-type, thick layered sediments existing as a reference and St.3: L-type, also as a reference, thick layered sediments existing. Piston cores and SBP images were already obtained in past cruises.

In this cruise MR15-E01 Leg3, first objective is to investigate multi-channel seismic (MCS) reflection survey for required pre-drilling site survey. We used portable high resolution MCS survey system to reveal structures around 150 mbsf where we need to know in detail. MCS lines are coordinated to cross above the sites St.1, 2, 3 and additional St.4 (ODP site 800 / KR13-02 PC3). Second objective is to obtain wide-area bathymetric data around proposed drill site. There were few data to study topography and MBES reflection intensity except St.1 where we already investigated ~60 nm² area around there. Third objective is to investigate SBP in penetration to ~50 mbsf. The data is continuously recorded in research area to identify distribution of 3 type of SBP facies.

Operations:

- We have surveyed 7 seismic lines, 877.5km long with 35,109 good shots.
- We have surveyed 31 MBES lines (include MCS lines) to widely cover St.2, 3 and 4.
- We have surveyed SBP, total magnetism and gravity throughout the cruise in research area.