Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS33-P01 Room:Poster Time:April 30 18:15-19:30

Seabed topography and geologic structure of 2000˜3500 m in water depth, off Miyagi prefecture

HAMADA, Mari[1] ; KAWAMURA, Kiichiro[1*] ; NAKAMURA, Yasuyuki[2] ; KODAIRA, Shuichi[2]

[1]Yamaguchi University, [2]JAMSTEC

Introduction

After three days from the 2011 Tohoku-oki earthquake, an emergency seismic survey was carried out in the Japan trench area, off Iwate and Miyagi. By this surveys, we collected seismic reflection images along 16 survey lines from fore-arc basin area at 2500 - 3500 m in water depth to trench floor area at ˜7000 m in water depth. We analyzed in detal geologic architecture of the fore-arc basin mainly in the 14 seismic reflection images across the Japan trench.

Research Overview

The fore-arc basin of the Japan trench consists of two sedimentary units; Paleogene and Neogene. At the base of the Paleogene unit, an Oligocene unconformity overlies Cretaceous rocks. Because of the complexity of the geologic architecture in the Japan trench, it could not easily decipher the spatial distribution of the sedimentary units.

Results and discussion

Based on the observations of 14 seismic reflection images, we noticed same structural features in the fore-arc basin region (e.g. thickness of seismic units, active faults, deformation structures, topography and so on), so that we divided the region into 5 areas as follows.

Area 1:

It is characterized by a thick seismic unit (probably Paleogene unit) above the Oligocene unconformity. The sides of this area are bounded by faults or folds. These features can see about 100 km from north to south. This unit thickening might be related to wedge extensional processes as shown in Tsuji et al. (2013).

Area 2:

The feature of the Area 2 is similar to that of Area 1. But we found two different points from the Area 1; 1) the continuity of the Area 2 is about 50 km from north to south. This is a half continuity of the Area 1. 2) the Area 2 is located further east (sea) side from the Area 1.

Area 3:

It is characterized by erosive features. This area is located in north of Area 2, but there is not features associated with Area 2. This erosive feature might be related to long-term erosion by subduction erosion processes as shown in von Huene et al. (1989).

Area 4:

This area is characterized by landward dipping Neogene sedimentary units. The depositional centers were shifted from sea (east) side to land (west) side. This shift might be related to tectonic erosion as shown in Arai et al. (2007).

Area 5:

This area is characterized by several active faults that extend and dislocate the seabed. This area is located relatively near the hypocenter of 2011 Tohoku-Oki earthquake, so that here might be active in recent.

Concluding remarks

In this analysis, we found five unique areas in the fore-arc basin region. These features would be a key to understanding for a further study associated with global and long-term tectonics in this region.

Keywords: Japan Trench, Seismic survey, Forearc Basin, Unconformity, 2011 Tohoku-Oki earthquake

Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS33-P02 Room:Poster Time:April 30 18:15-19:30

The development of the self pop-up ocean bottom pressure gauge (OBP) with precision thermometers attached

SUZUKI, Syuichi[1*] ; ITO, Yoshihiro[2] ; HINO, Ryota[3] ; INAZU, Daisuke[4] ; OSADA, Yukihito[3]

[1]Graduate School of Science, Tohoku University, [2]Disaster Prevention Research Institute, Kyoto University, [3]International Research Institute of Disaster Science, Tohoku University, [4]National Research Institute for Earth Science and Disaster Prevention

We have installed autonomous ocean bottom pressure recoreders (OBPRs) off Miyagi and off Nemuro to observe seafloor vertical displacements in response to large earthquakes and aseismic slip. Most notably, an uplift of 5 m due to the 2011 Tohoku-Oki earthquake (Ito et al., 2011) and transient crustal deformations accompanied by slow slip events that occurred before the earthquake (Ito et al., 2013) were measured by the OBPRs which had been installed off Miyagi since 2008. Recent our observations on seafloor show a seawater-temperature anomaly after the 2011 Tohoku-Oki earthquake (Arai et al., 2013.) Here we show our new OBPRs with precise thermometers to observe both of vertical displacement and temperature anomaly on seafloor.

We design the new OBPR with two precise thermometers. The two thermometers are exterior to our ordinal OBPR. A quartz crystal pressure sensor within the ordinal OBPR is firstly equipped with a thermometer, which is used for temperature compensation of output frequency of quartz oscillator. This means the thermometer with the ordinal OBPR measures a temperature within the vessel of the pressure sensor. By the new attached two thermometers, a actual seawater-temperature are measured accurately.

The development of OBPs with precise thermometers attached enables us to record temperatures of seafloor and seawater along with OBP observations. We are planning to deploy these newly developed OBPs around Japan trench and east off North Island of New Zealand. Especially at the landward Japan Trench slope, increase in the amount of water discharge has been reported by the submarine observation after the 2011 Tohoku-Oki earthquake. Therefore, the installation of the new OBPs with thermometers around this area is expected to allow us to observe not only the seafloor vertical displacements accompanying the postseismic deformation but also the time variation of seafloor water temperature associated with the time variation of the amount of water discharge.

Keywords: Two precise thermometers, Sea-bottom water temperature, Ocean bottom pressure gauge