

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

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### 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 detail 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 be seen 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 are 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