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

MIS33-P05 Room:Convention Hall Time:May 26 18:15-19:30

A 100-year stratum record and a 2011 Tohoku-Oki event record in the Japan Trench

FUJII, Minami[2] ; KAWAMURA, Kiichiro[1*] ; OGURI, Kazumasa[3] ; TOYOFUKU, Takashi[3] ; KANAMATSU, Toshiya[3] ; MURAYAMA, Masafumi[4] ; ARAI, Kazuno[5]

[1]Yamaguchi University/Present:Aratani CEC., [2]Yamaguchi University/JAMSTEC, [3]JAMSTEC, [4]Kochi University, [5]Saitama University

Introduction

In this study, we described detailed sedimentary structures in the core samples which was collected from a shelf, shelf break, gentle slope and deep-sea fan off Hachinohe, a bottom of the canyon off Sanriku, and a gentle slope off Sendai after the Tohoku-Oki earthquake. We observed a sandy sediment layer due to the 2011 event at the surface layer. To estimate the depositional age in the sediment layer, we analyzed 210Pb and 137Cs being radionuclides.

A depositional age can be typically estimated using a profile of 210Pbex calculated from various radionuclide analyses. 137Cs was dispersed into the atmosphere and settled into sediments after the nuclear weapons testing, so that the presence of 137Cs means that the sediment was deposited within 60 years.

Based on these radionuclide analyses, we disclosed a disturbance on the seafloor and in the sediments by the 2011 event. Additionally, we revealed steady and calm sedimentation processes within about 100 years throughout the core sediments. Thus, we deciphered an abrupt [short-term sedimentation] being an event deposition and a steady and calm [long-term stratum records] being a background deposition within about 100 years in the Tohoku area.

Samples

The sediments off Hachinohe were collected using a multiple core system during the cruise KT-11-20 by R/V Tansei-Maru (JAMSTEC) in August 2011. The sediments off Sendai and off Sanriku were collected using a MBARI core on the ROV HyperDorphin during the cruise NT12-12 by R/V Natsushima (JAMSTEC) in May 2012. These sampling methods are possible to collect sediments at the seafloor without any disturbances.

Results

As a result we summarized the [short-term sedimentation] as below.

1. At the shelf and shelf break off Hachinohe, there are coarse sandy sediment layers. Based on the 210Pb profiles and sedimentary structures, we concluded this sandy layer rapidly deposited due to the 2011 tsunami. However, we could not observe any coarse-grained sediment layers at the gentle slope and deep-sea fan.
2. At the gentle slope off Sendai, we observed a sandy sediment layer of 4 cm thick that was formed by a current from west to east; from landward to seaward at the top. The base of the layer is unconformity. We concluded that this sediment layer would be the 2011 event deposit.
3. At the bottom of the canyon off Sanriku, there is a sand layer that was likely formed rapidly at the top based on 210Pb profiles.

We summarized [long-term stratum records] as below.

1. At the gentle slope and deep-sea fan off Hachinohe, the sediment is deposited and consolidated gradually with burial. We can not extract any paleocurrent directions because of probably heavy bioturbation.
2. At off Sendai, we detected a paleocurrent from northeast to southwest throughout the core sediments. This might be a predominant bottom current within ˜100 years in this area.
3. At off Sanriku, we extracted a paleocurrent from southeast to northwest. Based on 210Pb profiles, the depositional rates were 0.061 cm/yr (0.068˜0.072 g/cm2/yr) at 5˜13 cm below seafloor, 0.109˜0.166 cm/yr (0.045˜0.076 g/cm2/yr).

Concluding remarks

We observed a deep-sea [off Sanriku] 2011 event layer which was also ever reported off Sendai. This layer was only observed at the shelf area off Hachinohe. Thus, our study disclosed in detail depositional area of the 2011 event layer. The distribution, depositional processes and preservation processes of this layer should be a clue to understanding for the [deep-sea] paleoseismological study. We need more information for this new deep-sea science. The study continues.