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R/V Kaiyo Cruise Report

KY09-06

Seismic study at the eastern margin of the Japan Sea and the northwestern Pacific region

Aug. 6, 2009 – Aug. 19, 2009

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

Contents:

1. Cruise Information :

(1) Cruise number, Ship name: KY09-06, R/V Kaiyo

(2) Title of the cruise: 2009FY "Seismic study at the eastern margin of the Japan Sea and the northwestern Pacific region"

(3) Title of proposal:

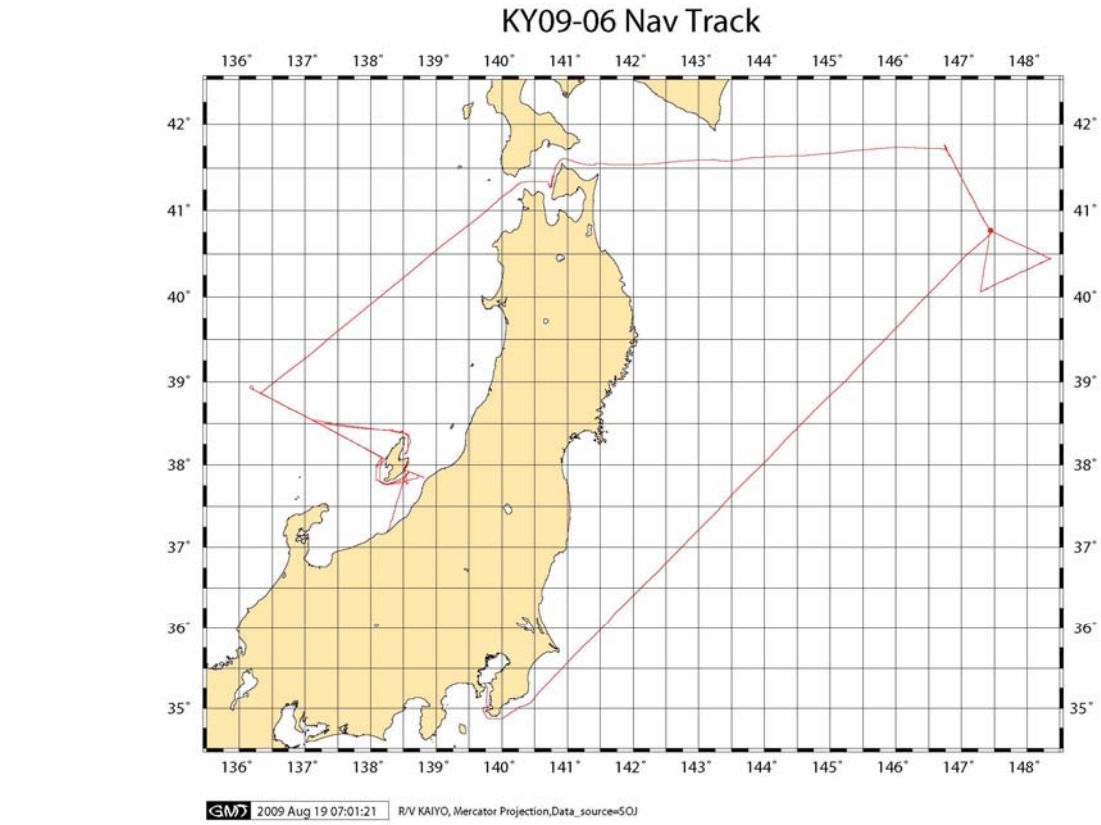
1) Seismic study for crustal deformation in the eastern margin of the Japan Sea.

2) High-resolution structure study in the northwestern Pacific region

(4) Cruise period, Port call: 2009/8/6-8/19, Naoetsu port to JAMSTEC (Yokosuka)

(5) Research Area: The eastern margin of the Japan Sea, Northwestern Pacific

(6) Research Map:



2. Researchers

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3. Overview of Observation :

(1) Objectives :

Recently, large earthquakes with M7 occurred along “the strain concentration areas”, which locates at the eastern margin of the Japan Sea and the western part of the Tohoku region. However, this area has not been located as one of priority areas to be investigated. Therefore, scientific studies has been performed to understand active faults and fold structures at the eastern margin of the Japan Sea and the western part of the Tohoku region in collaboration with Japanese research institutions as a part of the Kagakugijyutsu-shinko-choseihi; “the priority investigations of strain concentration areas” since 2008. The KY09-06 cruise entitled “Seismic intensive study around the deformed zone in the eastern margin of the Japan Sea” was carried out using seismic tools. The objectives of this cruise are to reveal the structural characteristics of the strain concentration areas using an airgun array with a total capacity of 12,000 cubic inches, 30 ocean bottom seismographs (OBSs) and a multi-channel seismic survey system (MCS). The airgun signals were recorded by land temporal stations, which are installed by Earthquake research institute, university of Tokyo. After that, we retrieved OBSs around the northeastern Pacific region for the Mohole project, which is to reveal what is typical oceanic crust and what is the Moho between a crust and mantle. These aims are one of priority scientific targets of the IODP. These OBSs were deployed during the KR09-04 cruise.

(2) List of observation instruments :

1) Refraction survey using ocean bottom seismographs (OBSs)

We deployed 30 OBSs at the off northwestern Sado shima and the Sado strait, and a refraction survey using an airgun array with a total capacity of 12,000 cubic inches. Three component velocity sensors and a pressure sensor, which are attached in each OBS, were received these seismic signals propagated from the airgun array. The shot interval was 200 m at the off northwestern Sato shima and 100 m in the Sado strait. Then, we recovered all OBSs after airgun shooting. After that, we recovered other 29 OBSs in the northwestern Pacific region, and one OBS was not recovered due to trouble of transponder system.

2) Multi-channel reflection seismic survey (MCS)

The seismic signals propagated by above airgun shooting were also recorded by a 16-channel hydrophone streamer to identify faults and folds in sedimentary and basement layers around the off northwestern Sado shima. The group interval is 25

m. MCS data was stored with a sampling rate of 4 msec and a record length of 13.5 sec.

3) Bathymetry, magnetic and gravity observation

During the cruise, bathymetry data have been recorded by SEABEAM2100.

4) XBT

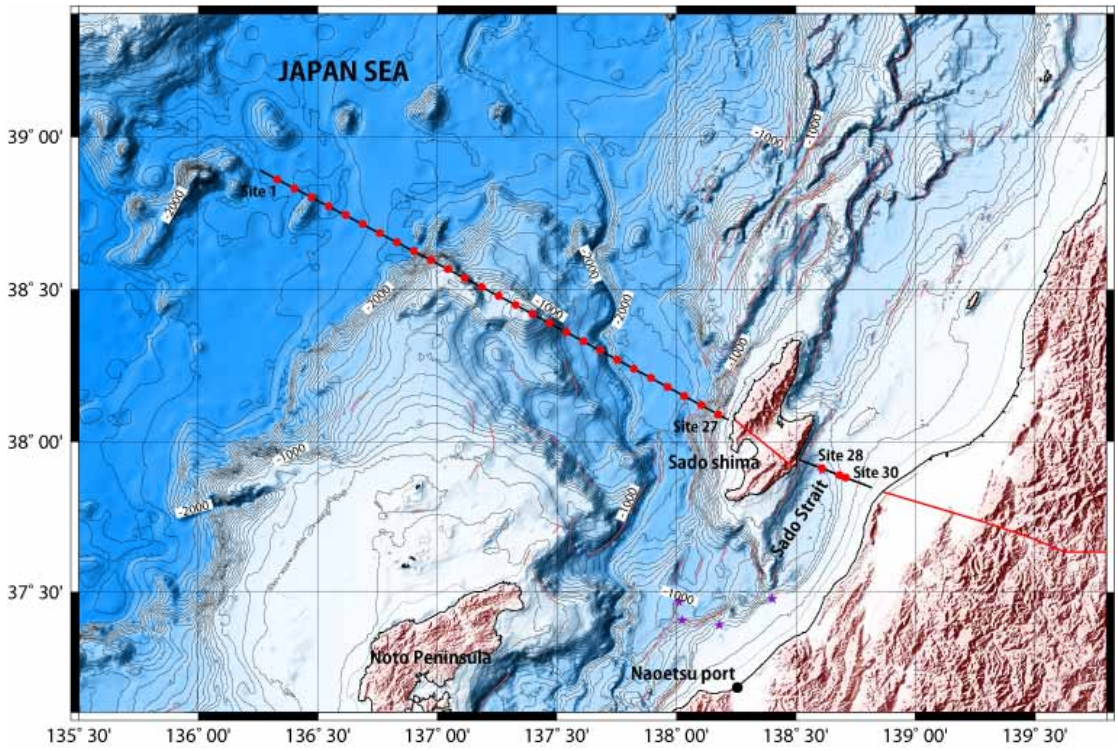
Expendable-Bathy Thermograph (XBT) has been conducted twice to correct the sonic speed for the bathymetry survey at the off northwestern Sado shima and the northwestern Pacific region

(3) Cruise log:

Date		Remarks
2009/8/6	Thu	Departure from Naoetsu port, transit to survey area at the eastern margin of the Japan Sea, and OBS deployment
2009/8/7	Fri	OBS deployment, XBT and airgun shooting
2009/8/8	Sat	Airgun shooting
2009/8/9	Sun	Airgun shooting and OBS retrieval
2009/8/10	Mon	OBS retrieval, and avoidance from expected typhoon attack
2009/8/11	Tue	OBS retrieval and transit to the Pacific region
2009/8/12	Wed	Transit to the Pacific region
2009/8/13	Thu	Avoidance from typhoon attack
2009/8/14	Fri	Transit to the Pacific region, XBT and OBS retrieval
2009/8/15	Sat	OBS retrieval
2009/8/16	Sun	OBS retrieval
2009/8/17	Mon	OBS retrieval and transit to JAMSTEC
2009/8/18	Tue	Transit to JAMSTEC
2009/8/19	Wed	Arrival at JAMSTEC (Yokosuka)

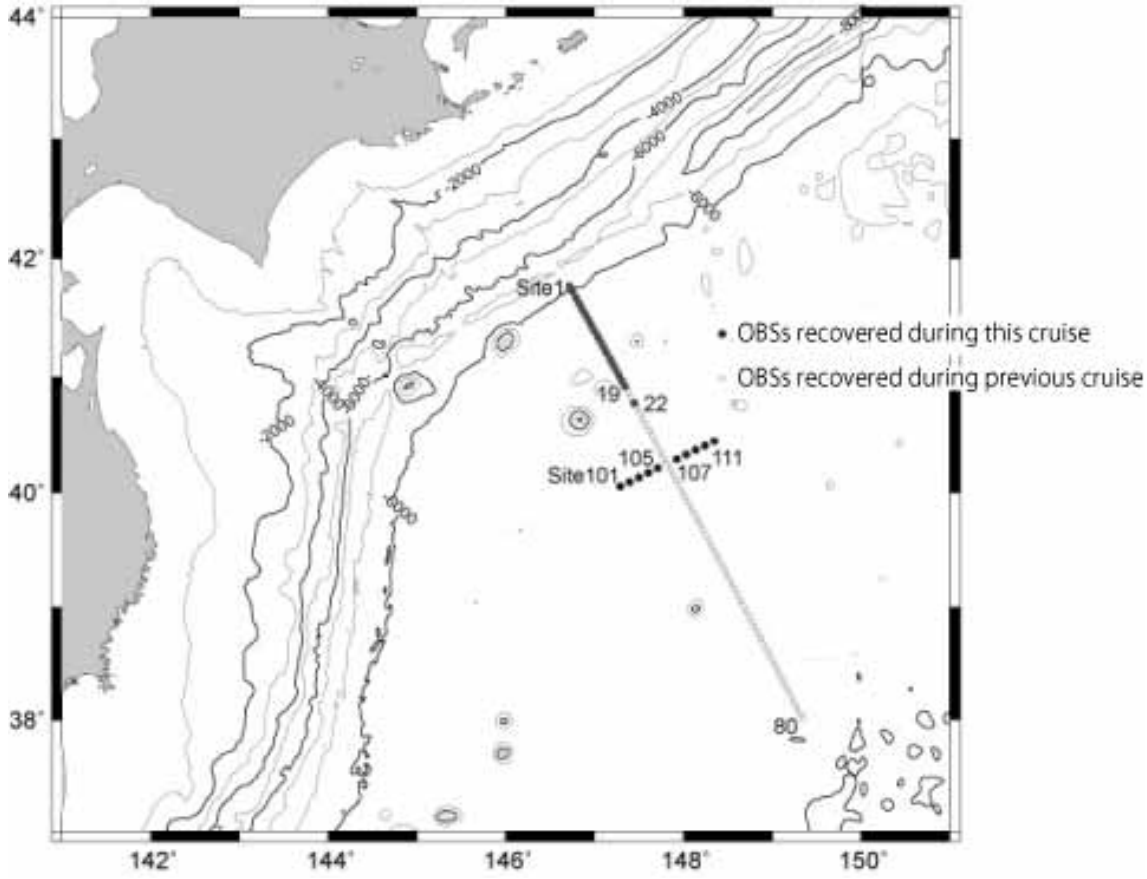
(4) Seismic lines

1) Eastern margin of the Japan Sea



Black lines are seismic lines conducted in this cruise. Red circles show the OBS sites. Temporal land stations were installed along red lines.

2) Northwestern Pacific region



Black circles show OBS locations to be recovered during this cruise. White circles show OBS locations, which were already recovered during previous cruise.

(5) Seismic line list

LineEMJS0906	Time (UTC)	Latitude (N)	Longitude (E)	Depth (m)	SP
First shot	09/8/7 11:16:43	38° 53.3807'	136° 15.5321'	2568	1001
Last shot	09/8/8 09:27:36	38° 04.0326'	138° 12.7419'	93	1968

Line EMJS0906a	Time (UTC)	Latitude (N)	Longitude (E)	Depth (m)	SP
First shot	09/8/9 01:29:43	37° 56.6197'	138° 30.8470'	109	999
Last shot	09/8/9 07:20:31	37° 50.9169'	138° 48.9718'	47	1285

(6) OBS list (Eastern margin of the Japan Sea)

Site	OBS Calibration position						Remarks
	Lat. (N)	Lon. (E)	Depth (m)	x	y	z	
1	38_51.6967	136_19.6278	2614.1	-	-	-	
2	38_49.9261	136_24.2155	2547.4	-	-	-	
3	38_48.1949	136_28.4444	2436.4	-	-	-	
4	38_46.4792	136_32.7356	2256.0	-	-	-	
5	38_44.6625	136_37.0067	2410.3	-	-	-	
6	38_42.8907	136_41.2316	2205.8	-	-	-	
7	38_41.1466	136_45.5607	2316.6				
8	38_39.4000	136_49.8351	2310.0	-	-	-	
9	38_38.9091	136_50.8992	1056.8	-	-	-	
10	38_35.8891	136_58.3680	737.3	-	-	-	
11	38_34.0946	137_02.5929	417.7	-	-	-	
12	38_32.3142	137_06.8336	326.2	-	-	-	
13	38_30.5376	137_11.0947	674.6	-	-	-	
14	38_28.7463	137_15.3770	567.8	-	-	-	
15	38_26.9624	137_19.6485	249.9	-	-	-	
16	38_25.1975	137_23.8349	445.3	-	-	-	
17	38_23.3992	137_28.0985	793.7	-	-	-	
18	38_21.6059	137_32.3650	1676	-	-	-	*1
19	38_19.7246	137_36.6004	1456.3	-	-	-	
20	38_18.0012	137_40.8279	1809.0	-	-	-	

21	38_16.1724	137_45.0358	1893	-	-	-	*1
22	38_14.4313	137_49.3066	1874.0	-	-	-	
23	38_12.6426	137_53.5966	1873	-	-	-	*1
24	38_10.8262	137_57.7073	1785.0	-	-	-	
25	38_08.9874	138_01.9972	1846.2	-	-	-	
26	38_07.1875	138_06.2015	1378.7	-	-	-	
27	38_05.3851	138_10.4159	513.5	-	-	-	
28	37_54.6923	138_36.4554	414	-	-	-	*1
29	37_53.3375	138_40.9551	202.7	-	-	-	
30	37_52.8704	138_42.4788	150.9	-	-	-	

*1: The depth value was water depth measured during OBS deployment, because the OBS position at the sea bottom was not directly measured using SSBL.

OBS list (Northwestern Pacific region)

Site	OBS Calibration position						Remarks
	Lat. (N)	Lon. (E)	Depth (m)	x	y	z	
1	41_46.1543	146_43.5061	6120.9	-	-	-	
2	41_43.2945	146_45.6783	6030.9	-	-	-	
3	41_40.3573	146_47.6446	5705.3	-	-	-	
4	41_37.5569	146_49.6430	5688	-	-	-	
5	41_34.9330	146_51.6151	5495.9	-	-	-	
6	41_31.8829	146_53.8431	5457	-	-	-	
7	41_29.1020	146_55.8095	5255.1				
8	41_26.3526	146_57.9707	5227.1	-	-	-	
9	41_23.5195	147_00.0121	5215.4	-	-	-	
10	41_20.6988	147_02.0558	5320.0	-	-	-	
11	41_17.7379	147_04.0560	5218.7	-	-	-	
12	41_14.8846	147_05.9987	5233.6	-	-	-	
13	41_12.0189	147_07.9735	4784.9	-	-	-	
14	41_09.2460	147_10.0100	5169.6	-	-	-	
15	41_06.3467	147_12.0968	4935.2	-	-	-	
16	41_03.4832	147_14.1913	5079.6	-	-	-	
17	41_00.5877	147_16.2213	5105.1	-	-	-	
18	40_57.7091	147_18.2030	5123.7	-	-	-	
19	40_54.9466	147_20.3059	5250.3	-	-	-	
22	-	-	-	-	-	-	Not retrieve
101	40_03.2458	147_17.2803	5318	-	-	-	*1

102	40_05.6204	147_23.6135	5313	-	-	-	*1
103	40_08.0090	147_29.9364	5290	-	-	-	*1
104	40_10.3854	147_36.2653	5283	-	-	-	*1
105	40_12.7487	147_42.5713	5294.3	-	-	-	
107	40_17.4172	147_55.3556	5356.9	-	-	-	
108	40_19.8459	148_01.6770	5345	-	-	-	*1
109	40_22.2050	148_08.0523	5372	-	-	-	*1
110	40_24.5487	148_14.4187	5409	-	-	-	*1
111	40_26.8811	148_20.8053	5432	-	-	-	*1

*1: The values were ship position at OBS deployment, because the OBS position at the sea bottom was not directly measured using SSBL.

4. Notice on using:

This cruise report is a preliminary documentation as of the end of the cruise. It may not be corrected even if changes on content (i.e. taxonomic classifications) are found after publication. It may also be changed without notice. Data on the cruise report may be raw or not processed. Please ask the PI for the latest information before using. Users of data or results of this cruise are requested to submit their results to Data Integration and Analysis Group (DIAG), JAMSTEC.