



R/V Kaiyo Cruise Report

KY14-E02



Detailed structural survey in the trench axis region
using high resolution seismic system

Japan Trench axis region

Oct. 03, 2014 - Oct. 27, 2014

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

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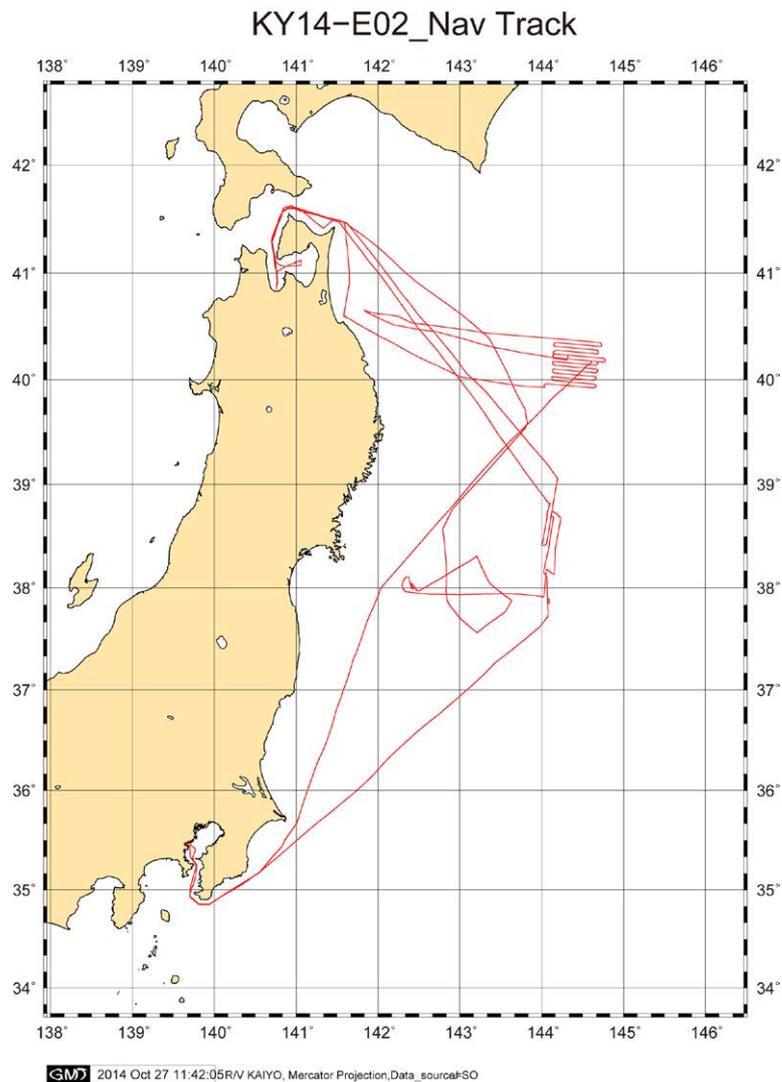
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Acknowledgement

1. Cruise Information

- Cruise ID: KY14-E02
- Name of vessel: R/V Kaiyo
- Title of the cruise: Detailed structural survey in the trench axis region using high resolution seismic system
- Title of proposal: Marine geological and geophysical research and surveys to unravel the subduction zone great earthquakes and tsunamis: Detailed structural survey in the trench axis region using high resolution seismic system
- Cruise period: 2014/10/03 – 2014/10/27
 [Leg 1] 2014/10/03 – 2014/10/15, [Leg 2] 2014/10/15 – 2014/10/27
- Ports of departure / call / arrival: Yokohama (Shinko) – Aomori – Yokohama (JMU Tsurumi)
- Research area: Japan Trench axis region
- Ship track



2. Researchers

- Chief scientists: Mikiya Yamashita (Leg 1) [JAMSTEC], Yasuyuki Nakamura (Leg 2) [JAMSTEC]
- Representative of the science party: Shuichi Kodaira [JAMSTEC]
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 - Takafumi KASAYA [JAMSTEC]

3. Observation

3.1 Background and objectives

The 2011 Off the Pacific Coast of Tohoku Earthquake (Tohoku Earthquake: M9) was the largest earthquake in the Japanese history of earthquake observation. The plate boundary faults which was ruptured through the trench axis area were clearly imaged by the high-resolution seismic data obtained during KY11-E05 cruise. This observation and related studies exploded widely accepted conceptual model of the subduction zone earthquake, however the seismic survey area was limited within the vicinity of the epicenter of Tohoku Earthquake off central Miyagi. Thus further investigations in whole region of the Japan Trench, off Aomori to the north, off Ibaraki to the south, are necessary to understand the mechanism of the great subduction zone earthquakes and Tsunami generation in the Japan Trench region. Several tsunamigenic great earthquakes have occurred in the Japan Trench area before the 2011 Tohoku Earthquake, therefore understanding of the possible seismogenic and tsunamigenic structure of this region is indispensable to prevent or mitigate the disasters caused by the future great earthquakes.

The purpose of this cruise was to obtain detailed structural image in the northern part of the Japan Trench axis area off Iwate-Aomori using high resolution (portable) multichannel reflection seismic system. The

seismic site survey data for International Ocean Discovery Program (IODP) proposals in the Japan Trench region (JTRACK and JTRACK-PalSEIS) were also acquired during this cruise.

3.2 List of observations

(1) High resolution seismic reflection survey

A cluster gun array with 380 inch³ of total volume was towed at 5 m depth. The guns were fired every 37.5 m. Seismic data was recorded with a 192 channel, 1300-m-long streamer cable, which was towed at 6 m depth. Twenty two seismic lines were completed during the cruise. Source signature observation was also conducted.

(2) XCTD casts

The XCTD casts were conducted at 7 locations during the cruise to obtain accurate velocity profile in the water column.

(3) Bathymetry measurements

Bathymetry data were recorded during the cruise.

3.3 List of observation equipments

PMCS system (192 channel streamer cable, maximum offset ~1.3 km)

Cluster gun (40 inch³ x2, 150 inch³ x2)

Seabeam 2112

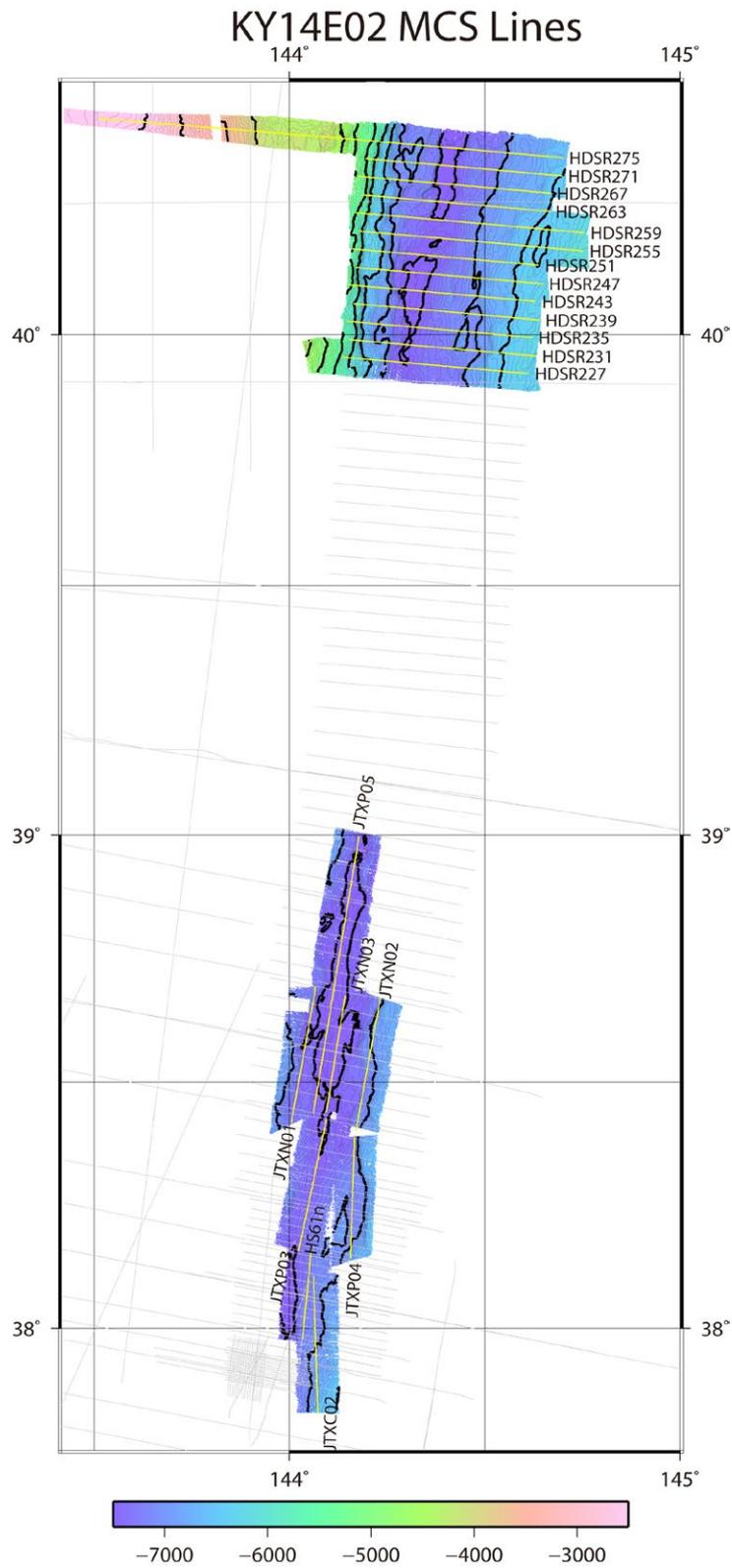
XCTD

3.4 Cruise log

Date	Log	Remaks	
10/03/2014	Departed from Yokohama, Transit to survey area	Leg 1	
10/04/2014	Transit to survey area, Lines JTXC02, JTXP03	↑ ↓	
10/05/2014	Line JTXN03, JTXP05, transit to Mutsu bay for typhoon evacuation		
10/06/2014	Stay at Mutsu bay for typhoon evacuation		
10/07/2014	Departed from Mutsu bay, transit to survey area		
10/08/2014	Cable maintenance, Lines JTXN01, JTXP05		
10/09/2014	Lines JTXN02, JTXP04, HS61n, transit to off Kinkasan		
10/10/2014	Stay off Kinkasan		
10/11/2014	Departed from Kinkasan, transit to survey area		
10/12/2014	Airgun source signature observation, transit to Mutsu bay		
10/13/2014	Transit to Mutsu bay for typhoon evacuation		
10/14/2014	Stay at Mutsu bay for typhoon evacuation		
10/15/2014	Stay at Mutsu bay for typhoon evacuation, Scientists disembark/embark		Leg1/Leg2
10/16/2014	Departed from Mutsu bay, transit to off Hachinohe		↑ ↓
10/17/2014	Stay off Hachinohe, cable maintenance		
10/18/2014	Departed from off Hachinohe, transit to survey area, Line HDSR227		
10/19/2014	Lines HDSR231, HDSR235, HDSR239		
10/20/2014	Lines HDSR243, HDSR247, HDSR251		
10/21/2014	Lines HDSR255, HDSR259, transit to off Hachinohe		
10/22/2014	Stay off Hachinohe, cable maintenance, departed from off Hachinohe		
10/23/2014	Transit to survey area, Line HDSR275		
10/24/2014	Lines HDSR271, HDSR267, HDSR263		
10/25/2014	Lines HDSR259, HDSR255, cable maintenance, departed from survey area		
10/26/2014	Transit to Yokohama		
10/27/2014	Arrived at Yokohama, JMU Tsurumi	Leg2	

3.5 Research Information

Survey Line Map



MCS Line List

LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P.	VESSEL POSITION	
			F.G.S.P.		
			L.G.S.P.	Lat.	Lon.
			L.S.P.		
HDSR227_0	18/10/2014	08:43:08	969	39_57.30117'N	144_08.15783'E
	18/10/2014	08:49:41	993	39_57.26567'N	144_08.78867'E
	18/10/2014	13:41:31	2069	39_55.34133'N	144_36.98583'E
	18/10/2014	13:41:31	2069	39_55.34133'N	144_36.98583'E
HDSR231_0	18/10/2014	15:01:27	2100	39_57.43400'N	144_37.97567'E
	18/10/2014	15:12:14	2075	39_57.48617'N	144_37.32117'E
	18/10/2014	23:00:31	1000	39_59.40267'N	144_09.13467'E
	18/10/2014	23:00:31	1000	39_59.40267'N	144_09.13467'E
HDSR235_0	19/10/2014	00:08:37	2493	40_01.62467'N	144_08.64283'E
	19/10/2014	00:15:16	2518	40_01.56450'N	144_09.29733'E
	19/10/2014	04:57:53	3593	39_59.63917'N	144_37.49733'E
	19/10/2014	04:57:53	3593	39_59.63917'N	144_37.49733'E
HDSR239_0	19/10/2014	05:57:42	3624	40_01.72850'N	144_38.48583'E
	19/10/2014	06:17:08	3575	40_01.82483'N	144_37.20150'E
	19/10/2014	13:12:23	2524	40_03.70683'N	144_09.61633'E
	19/10/2014	13:12:23	2524	40_03.70683'N	144_09.61633'E
HDSR243_0	19/10/2014	14:20:16	969	40_05.89367'N	144_09.13517'E
	19/10/2014	14:27:22	994	40_05.85383'N	144_09.79233'E
	19/10/2014	19:16:54	2069	40_03.93383'N	144_38.02183'E
	19/10/2014	19:16:54	2069	40_03.93383'N	144_38.02183'E
HDSR247_0	19/10/2014	20:41:22	2100	40_06.03500'N	144_39.01433'E
	19/10/2014	20:53:13	2075	40_06.08117'N	144_38.35817'E
	20/10/2014	04:26:32	1000	40_08.00450'N	144_10.11383'E
	20/10/2014	04:26:32	1000	40_08.00450'N	144_10.11383'E
HDSR251_0	20/10/2014	05:48:04	969	40_10.20467'N	144_09.62567'E
	20/10/2014	05:55:23	994	40_10.15283'N	144_10.28233'E
	20/10/2014	11:25:26	2069	40_08.23950'N	144_38.54167'E
	20/10/2014	11:25:26	2069	40_08.23950'N	144_38.54167'E
HDSR255_0	20/10/2014	12:44:41	2100	40_10.33450'N	144_39.53600'E
	20/10/2014	12:56:05	2075	40_10.38150'N	144_38.87917'E

	20/10/2014	20:58:59	1000	40_12.30500'N	144_10.60483'E
	20/10/2014	20:58:59	1000	40_12.30500'N	144_10.60483'E
HDSR255_1	24/10/2014	19:42:56	2317	40_09.93000'N	144_45.23867'E
	24/10/2014	19:56:48	2292	40_09.97800'N	144_44.58117'E
	24/10/2014	22:12:02	2018	40_10.48933'N	144_37.38067'E
	24/10/2014	22:12:02	2018	40_10.48933'N	144_37.38067'E
HDSR259_0	20/10/2014	22:31:57	969	40_14.49883'N	144_10.11583'E
	20/10/2014	22:39:51	994	40_14.46133'N	144_10.77467'E
	21/10/2014	00:15:05	1281	40_13.95550'N	144_18.33017'E
	21/10/2014	00:15:05	1281	40_13.95550'N	144_18.33017'E
HDSR259_1	24/10/2014	11:56:57	969	40_14.50367'N	144_10.11683'E
	24/10/2014	12:04:18	994	40_14.45983'N	144_10.77483'E
	24/10/2014	18:33:02	2313	40_12.08050'N	144_45.47917'E
	24/10/2014	18:33:02	2313	40_12.08050'N	144_45.47917'E
HDSR263_0	24/10/2014	04:11:16	2100	40_14.63300'N	144_40.05783'E
	24/10/2014	04:21:05	2075	40_14.68067'N	144_39.40050'E
	24/10/2014	10:47:43	1000	40_16.60517'N	144_11.09633'E
	24/10/2014	10:47:43	1000	40_16.60517'N	144_11.09633'E
HDSR267_0	23/10/2014	21:45:56	969	40_18.80217'N	144_10.60850'E
	23/10/2014	21:53:02	994	40_18.75850'N	144_11.26717'E
	24/10/2014	03:12:22	2096	40_16.78283'N	144_40.29667'E
	24/10/2014	03:12:22	2096	40_16.78283'N	144_40.29667'E
HDSR271_0	23/10/2014	13:59:43	2153	40_18.83733'N	144_41.97733'E
	23/10/2014	14:08:42	2128	40_18.87717'N	144_41.31850'E
	23/10/2014	20:27:43	1000	40_20.90417'N	144_11.58983'E
	23/10/2014	20:27:43	1000	40_20.90417'N	144_11.58983'E
HDSR275_0	22/10/2014	23:48:51	969	40_25.62633'N	143_30.84450'E
	22/10/2014	23:56:28	994	40_25.58667'N	143_31.50567'E
	23/10/2014	12:57:50	3673	40_20.99117'N	144_42.20950'E
	23/10/2014	12:57:50	3673	40_20.99117'N	144_42.20950'E
HS61n_0	09/10/2014	02:50:54	2232	38_09.98500'N	144_03.29000'E
	09/10/2014	03:02:39	2207	38_09.47267'N	144_03.32833'E
	09/10/2014	06:40:26	1665	37_58.53900'N	144_02.00183'E
	09/10/2014	06:40:26	1665	37_58.53900'N	144_02.00183'E
JTXC02_0	04/10/2014	05:59:36	969	37_49.59050'N	144_04.36717'E

	04/10/2014	06:11:45	1015	37_50.52183'N	144_04.32533'E
	04/10/2014	06:34:47	1102	37_52.28383'N	144_04.25983'E
	04/10/2014	06:42:00	1129	37_52.83420'N	144_04.23520'E
JTXC02_1	04/10/2014	08:32:26	1099	37_52.22267'N	144_04.25183'E
	04/10/2014	08:32:44	1100	37_52.24317'N	144_04.25300'E
	04/10/2014	11:40:47	1801	38_06.44033'N	144_03.70567'E
	04/10/2014	11:40:47	1801	38_06.44033'N	144_03.70567'E
JTXN01_0	08/10/2014	03:26:45	1832	38_41.71483'N	144_03.92733'E
	08/10/2014	03:33:32	1807	38_41.19600'N	144_03.94500'E
	08/10/2014	07:32:47	1000	38_25.09983'N	144_00.31600'E
	08/10/2014	07:32:47	1000	38_25.09983'N	144_00.31600'E
JTXN02_0	08/10/2014	16:18:25	1832	38_40.20033'N	144_13.93433'E
	08/10/2014	16:31:42	1807	38_39.70267'N	144_13.81833'E
	08/10/2014	21:16:36	1015	38_23.91467'N	144_10.18050'E
	08/10/2014	21:16:36	1015	38_23.91467'N	144_10.18050'E
JTXN03_0	04/10/2014	16:52:34	989	38_26.35483'N	144_05.63783'E
	04/10/2014	16:55:26	998	38_26.53467'N	144_05.67717'E
	04/10/2014	20:25:34	1701	38_40.58983'N	144_08.60167'E
	04/10/2014	20:25:34	1701	38_40.58983'N	144_08.60167'E
JTXP03_0	04/10/2014	12:30:36	989	38_09.43700'N	144_01.40033'E
	04/10/2014	12:34:06	1001	38_09.67533'N	144_01.46533'E
	04/10/2014	16:36:24	1801	38_25.53733'N	144_05.69167'E
	04/10/2014	16:36:24	1801	38_25.53733'N	144_05.69167'E
JTXP04_0	08/10/2014	21:28:11	1730	38_23.25817'N	144_10.01433'E
	08/10/2014	21:28:11	1730	38_23.25817'N	144_10.01433'E
	09/10/2014	01:14:33	1001	38_08.49983'N	144_09.35617'E
	09/10/2014	01:14:57	1000	38_08.47917'N	144_09.35467'E
JTXP05_0	04/10/2014	20:59:23	1770	38_42.25283'N	144_07.02733'E
	04/10/2014	21:10:25	1807	38_42.99433'N	144_07.16417'E
	05/10/2014	01:32:54	2654	38_59.92833'N	144_10.70217'E
	05/10/2014	01:32:54	2654	38_59.92833'N	144_10.70217'E
JTXP05_1	08/10/2014	09:20:17	969	38_26.23283'N	144_03.70850'E
	08/10/2014	09:27:41	994	38_26.73367'N	144_03.80633'E
	08/10/2014	13:16:46	1845	38_43.75250'N	144_07.33117'E
	08/10/2014	13:16:46	1845	38_43.75250'N	144_07.33117'E

*F.S.P.: First Shot Point, F.G.S.P: First Good Shot Point

L.G.S.P.: Last Good Shot Point, L.S.P.: Last Shot Point

4. Notice on Using

This cruise report is a preliminary documentation as of the end of the cruise.

This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.

Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.

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