



R/V Yokosuka Cruise Report

YK17-22

Marine Geological and Geophysical surveys

to investigate the nature

of subduction zone mega earthquakes and tsunamis

2. High resolution seismic surveys in the trench axis area

Japan Trench

Oct.13, 2017-Nov.5, 2017

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

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1. Cruise Information

- Cruise ID: YK17-22
- Name of vessel: Yokosuka
- Title of the cruise: Marine Geological and Geophysical surveys to investigate the nature of subduction zone mega earthquakes and tsunamis

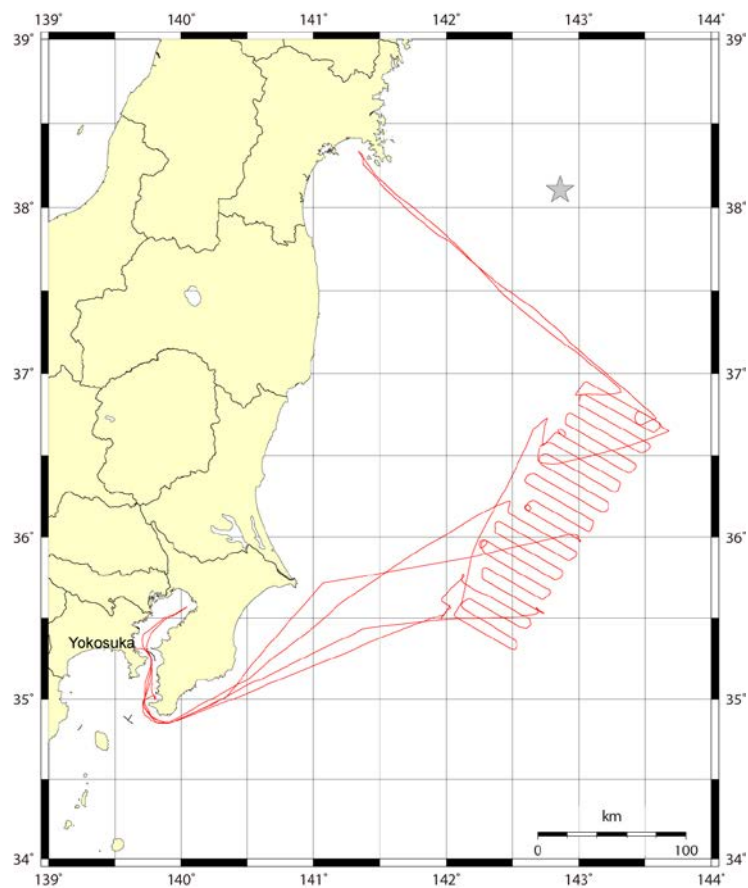
2. High resolution seismic surveys in the trench axis area

- Title of proposal: Marine Geological and Geophysical surveys to investigate the nature of subduction zone mega earthquakes and tsunamis

2. High resolution seismic surveys in the trench axis area

- Cruise period: 2017/10/13 – 2017/11/5
- Ports of departure / call / arrival: Yokosuka (JAMSTEC) – Yokosuka (JAMSTEC)
- Research area: Japan Trench
- Research Map

Cruise Track



2. Researchers

- Chief scientist [Affiliation]: Yasuyuki Nakamura [JAMSTEC]
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- Science party (List) [Affiliation]
 - Shuichi KODAIRA [JAMSTEC]
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 - Tetsuo NO [JAMSTEC]
 - Ryuta ARAI [JAMSTEC]
 - Taro SHIRAI [JAMSTEC]
 - Koichiro OBANA [JAMSTEC]
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 - Yojiro YAMAMOTO [JAMSTEC]
 - Toshiya KANAMATSU [JAMSTEC]
 - Toshiya FUJIWARA [JAMSTEC]
 - 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. 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 entire region of the Japan-Kuril Trench, off Hokkaido 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 purposes of this cruise was to obtain detailed structural image in the southern part of the Japan Trench axis area off Ibaraki and Fukushima region using high resolution (portable) multichannel reflection seismic system.

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 50 or 62.5 m. Seismic data was recorded with a 192 channel, 1300-m-long streamer cable, which was towed at 6 m depth. Seven seismic lines were completed during the cruise.

(2) XCTD casts

The XCTD casts were conducted at 2 locations during the cruise to obtain accurate velocity profile in the water column.

(3) Bathymetry measurements

Bathymetry data were recorded during the cruise.

(4) Sub-bottom profiler

Sub-bottom profiler 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)

EM 122

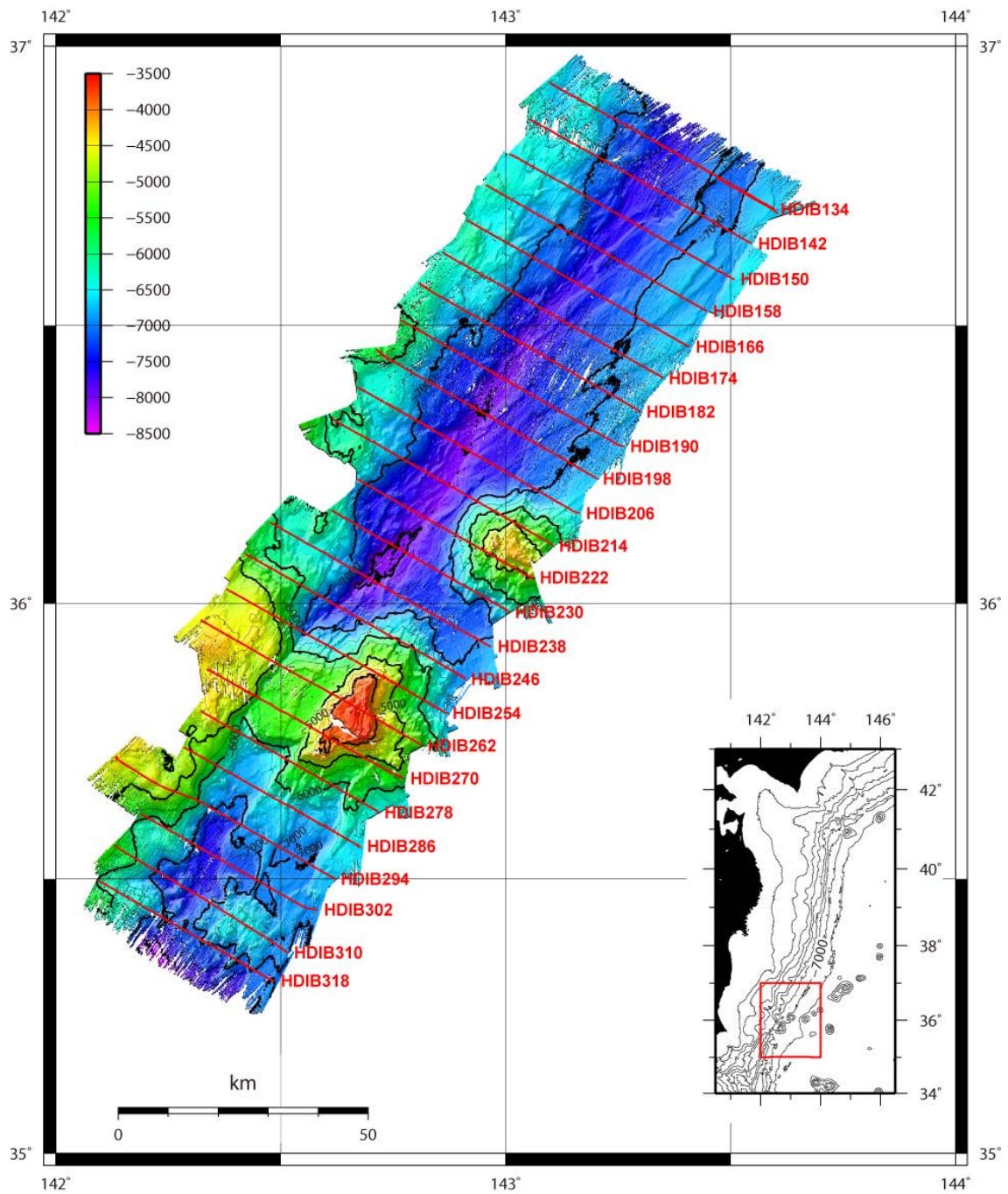
XCTD

3.4 Cruise log

Date	Log
10/13/2017	Departure from Yokosuka, transit to survey area
10/14/2017	Arrival at survey area, MCS Line HDIB294
10/15/2017	MCS Lines HDIB302, HDIB310, HDIB318
10/16/2017	MCS Lines HDIB174, HDIB166
10/17/2017	MCS Lines HDIB166, HDIB158, HDIB150
10/18/2017	MCS Lines HDIB150, HDIB142, HDIB134, transit to Ishinomaki bay
10/19/2017	Arrival at Ishinomaki bay, stay at Ishinomaki bay due to typhoon evacuation
10/20/2017	Stay at Ishinomaki bay due to typhoon evacuation
10/21/2017	Stay at Ishinomaki bay due to typhoon evacuation
10/22/2017	Stay at Ishinomaki bay due to typhoon evacuation a
10/23/2017	Stay at Ishinomaki bay due to typhoon evacuation
10/24/2017	transit to survey area, MCS Line HDIB134
10/25/2017	MCS Lines HDIB134, HDIB182, HDIB190
10/26/2017	MCS Lines HDIB190, HDIB198, HDIB206
10/27/2017	MCS Lines HDIB206, HDIB214, HDIB222
10/28/2017	MCS Lines HDIB222, HDIB214, HDIB230, transit to Tokyo bay
10/29/2017	Arrival at Tokyo bay, stay at Tokyo bay due to typhoon evacuation
10/30/2017	Stay at Tokyo bay and Tateyama bay due to typhoon evacuation
10/31/2017	Transit to survey area, MCS Line HDIB286
11/01/2017	MCS Lines HDIB278, HDIB270
11/02/2017	MCS Lines HDIB262, HDIB254
11/03/2017	MCS Lines HDIB246, HDIB238, transit to Yokosuka
11/04/2017	Transit to Yokosuka
11/05/2017	Arrival at Yokosuka

3.5 Research Information

MCS Line Map with bathymetry data



MCS Line List

NO.	LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P.	VESSEL POSITION		NUMBER OF SHOTS <u>(Increment)</u>	LENGTH (km)	DIRECTION (°)	Mode (m)
				F.G.S.P.						
				L.G.S.P.						
				L.S.P.						
1	HDIB134_0	18/10/2017	07:22:10	2035	36_41.83100'N	143_36.59317'E	268 (-1)	13.4	297.896	Distance (50.0m)
		18/10/2017	07:34:14	2011	36_42.32333'N	143_35.99833'E				
		18/10/2017	09:40:22	1744	36_45.87133'N	143_28.18950'E				
		18/10/2017	09:40:22	1744	36_45.87133'N	143_28.18950'E				
2	HDIB134_1	24/10/2017	11:24:20	969	36_56.21967'N	143_05.35867'E	812 (+1)	50.7	117.896	Distance (62.5m)
		24/10/2017	11:34:07	993	36_55.79533'N	143_06.22217'E				
		24/10/2017	17:11:03	1804	36_42.36450'N	143_35.92833'E				
		24/10/2017	17:11:03	1804	36_42.36450'N	143_35.92833'E				
3	HDIB142_0	17/10/2017	22:58:46	978	36_52.31750'N	143_02.86217'E	1003 (-1)	50.1	117.906	Distance (50.0m)
		17/10/2017	23:10:08	1002	36_52.02633'N	143_03.58683'E				
		18/10/2017	05:49:04	2004	36_38.78367'N	143_32.95000'E				
		18/10/2017	05:49:04	2004	36_38.78367'N	143_32.95000'E				
4	HDIB150_0	17/10/2017	10:43:05	2035	36_34.80850'N	143_30.77933'E	1012 (+1)	50.6	297.935	Distance (50.0m)
		17/10/2017	10:58:30	2011	36_35.11400'N	143_30.06933'E				
		17/10/2017	21:24:54	1000	36_48.48683'N	143_00.47533'E				
		17/10/2017	21:24:54	1000	36_48.48683'N	143_00.47533'E				
5	HDIB158_0	17/10/2017	03:05:45	977	36_45.23800'N	142_57.05067'E	1004	50.2	118.377	Distance

		17/10/2017	03:15:01	1001	36_44.88733'N	142_57.73050'E				(50.0m)
		17/10/2017	08:49:53	2004	36_31.46517'N	143_26.96133'E				
		17/10/2017	08:49:53	2004	36_31.46517'N	143_26.96133'E				
										(-1)
6	HDIB166_0	16/10/2017	11:59:02	2035	36_27.47567'N	143_24.79033'E				
		16/10/2017	12:28:21	2011	36_27.79883'N	143_24.09433'E	1012	50.6	298.415	Distance (50.0m)
		17/10/2017	01:18:24	1000	36_41.34950'N	142_54.66667'E				
		17/10/2017	01:18:24	1000	36_41.34950'N	142_54.66667'E				
7	HDIB174_0	16/10/2017	01:35:46	979	36_37.97533'N	142_51.23900'E				
		16/10/2017	01:45:45	1003	36_37.64817'N	142_51.93417'E	27			
		16/10/2017	01:55:39	1029	36_37.29983'N	142_52.69150'E		1.3	118.443	Distance (50.0m)
		16/10/2017	01:55:39	1029	36_37.29983'N	142_52.69150'E				
8	HDIB174_1	16/10/2017	03:57:55	977	36_38.13350'N	142_51.26500'E				
		16/10/2017	04:08:22	1001	36_37.66650'N	142_51.87033'E	1003	50.1	118.443	Distance (50.0m)
		16/10/2017	09:48:41	2003	36_24.25283'N	143_21.02367'E				
		16/10/2017	09:49:01	2004	36_24.23800'N	143_21.05183'E				
9	HDIB182_0	25/10/2017	02:33:18	969	36_34.62833'N	142_47.80733'E				
		25/10/2017	02:44:10	993	36_34.27883'N	142_48.71467'E	811	50.6	118.453	Distance (62.5m)
		25/10/2017	08:56:17	1803	36_20.62983'N	143_18.08900'E				
		25/10/2017	08:56:17	1803	36_20.62983'N	143_18.08900'E				
10	HDIB190_0	25/10/2017	10:36:17	2035	36_16.87133'N	143_16.11167'E				
		25/10/2017	10:48:58	2011	36_17.00633'N	143_15.28250'E	1012	50.6	298.500	Distance (50.0m)
		25/10/2017	20:27:45	1000	36_30.50750'N	142_45.88850'E				

		25/10/2017	20:27:45	1000	36_30.50750'N	142_45.88850'E	(-1)			
11	HDIB198_0	25/10/2017	23:14:30	969	36_27.62033'N	142_42.41483'E	1012	50.6	118.537	Distance (50.0m)
		25/10/2017	23:32:51	993	36_27.08917'N	142_42.97900'E				
		26/10/2017	07:55:47	2004	36_13.38900'N	143_12.22783'E	(-1)			
		26/10/2017	07:55:47	2004	36_13.38900'N	143_12.22783'E				
12	HDIB206_0	26/10/2017	10:04:24	2035	36_09.56633'N	143_10.18700'E	1012	50.6	298.565	Distance (50.0m)
		26/10/2017	10:16:38	2011	36_09.78083'N	143_09.41317'E				
		26/10/2017	18:13:28	1000	36_23.29983'N	142_40.08383'E	(-1)			
		26/10/2017	18:13:28	1000	36_23.29983'N	142_40.08383'E				
13	HDIB214_0	26/10/2017	21:15:44	969	36_20.08900'N	142_36.39967'E	1011	50.5	118.593	Distance (50.0m)
		26/10/2017	21:32:15	994	36_19.70917'N	142_37.10217'E				
		27/10/2017	08:59:53	2004	36_06.15783'N	143_06.36117'E	(-1)			
		27/10/2017	08:59:53	2004	36_06.15783'N	143_06.36117'E				
14	HDIB222_0	27/10/2017	11:42:13	2027	36_02.39033'N	143_04.08200'E	804	40.2	298.623	Distance (50.0m)
		27/10/2017	11:53:47	2003	36_02.60583'N	143_03.31717'E				
		27/10/2017	17:16:19	1200	36_13.35417'N	142_40.04717'E	(-1)			
		27/10/2017	17:16:19	1200	36_13.35417'N	142_40.04717'E				
15	HDIB230_0	27/10/2017	21:58:41	1169	36_10.10867'N	142_36.36183'E	810	40.5	118.658	Distance (50.0m)
		27/10/2017	22:11:40	1194	36_09.77483'N	142_37.09017'E				
		28/10/2017	05:39:01	2003	35_58.93117'N	143_00.48600'E	(-1)			
		28/10/2017	05:39:01	2003	35_58.93117'N	143_00.48600'E				
16	HDIB238_0	02/11/2017	22:02:04	2034	35_54.93650'N	142_58.36367'E	1011	50.5	298.686	Distance

		02/11/2017	22:20:17	2010	35_55.25767'N	142_57.67683'E				(50.0m)
		03/11/2017	08:35:30	1000	36_08.80200'N	142_28.46633'E				
		03/11/2017	08:35:30	1000	36_08.80200'N	142_28.46633'E	(-1)			
17	HDIB246_0	02/11/2017	14:20:16	975	36_05.45233'N	142_24.95217'E				
		02/11/2017	14:29:29	999	36_05.13500'N	142_25.64867'E	1006	50.3	118.714	Distance (50.0m)
		02/11/2017	20:47:40	2004	35_51.66383'N	142_54.68167'E				
		02/11/2017	20:47:40	2004	35_51.66383'N	142_54.68167'E	(-1)			
18	HDIB254_0	02/11/2017	01:03:20	2027	35_47.67333'N	142_52.26617'E				
		02/11/2017	01:16:36	2003	35_48.10617'N	142_51.65817'E	1004	50.2	298.723	Distance (50.0m)
		02/11/2017	12:36:23	1000	36_01.54267'N	142_22.68850'E				
		02/11/2017	12:36:23	1000	36_01.54267'N	142_22.68850'E	(-1)			
19	HDIB262_0	01/11/2017	16:55:18	969	35_58.28183'N	142_19.01800'E				
		01/11/2017	17:05:07	994	35_57.93067'N	142_19.72967'E	1010	50.5	118.778	Distance (50.0m)
		01/11/2017	23:56:33	2003	35_44.44283'N	142_48.85583'E				
		01/11/2017	23:56:33	2003	35_44.44283'N	142_48.85583'E	(-1)			
20	HDIB270_0	01/11/2017	01:58:50	2028	35_40.65233'N	142_46.66433'E				
		01/11/2017	02:11:09	2004	35_40.98383'N	142_45.99233'E	896	44.8	298.860	Distance (50.0m)
		01/11/2017	10:24:38	1109	35_52.82150'N	142_20.07650'E				
		01/11/2017	10:38:44	1081	35_53.20133'N	142_19.27683'E	(-1)			
21	HDIB278_0	31/10/2017	18:36:56	1169	35_48.36733'N	142_19.05683'E				
		31/10/2017	18:47:00	1193	35_48.02967'N	142_19.73800'E	811	40.5	118.815	Distance (50.0m)
		01/11/2017	00:51:38	2003	35_37.17650'N	142_43.05983'E				

		01/11/2017	00:51:38	2003	35_37.17650'N	142_43.05983'E	(-1)			
22	HDIB286_0	31/10/2017	05:53:25	2034	35_33.18567'N	142_40.95850'E	811	40.5	298.860	Distance (50.0m)
		31/10/2017	06:09:34	2010	35_33.50617'N	142_40.26750'E				
		31/10/2017	16:49:55	1200	35_44.38333'N	142_16.96783'E	(-1)			
		31/10/2017	16:49:55	1200	35_44.38333'N	142_16.96783'E				
23	HDIB294_0	14/10/2017	04:29:02	977	35_43.41683'N	142_07.60367'E	1003	50.1	118.869	Distance (50.0m)
		14/10/2017	04:41:11	1001	35_42.98350'N	142_08.21917'E				
		14/10/2017	12:29:02	2003	35_29.92233'N	142_37.29783'E				
		14/10/2017	12:29:02	2003	35_29.92233'N	142_37.29783'E	(-1)			
24	HDIB302_0	14/10/2017	14:25:16	2026	35_26.50250'N	142_35.29750'E	803	40.1	298.897	Distance (50.0m)
		14/10/2017	14:39:02	2002	35_26.66033'N	142_34.49583'E				
		14/10/2017	21:22:51	1200	35_37.09967'N	142_11.22933'E				
		14/10/2017	21:22:51	1200	35_37.09967'N	142_11.22933'E	(-1)			
25	HDIB310_0	14/10/2017	23:30:16	1169	35_33.81833'N	142_07.57800'E	811	40.5	118.951	Distance (50.0m)
		14/10/2017	23:42:07	1193	35_33.38550'N	142_08.19483'E				
		15/10/2017	06:21:10	2003	35_21.91050'N	142_31.02050'E				
		15/10/2017	06:21:10	2003	35_21.91050'N	142_31.02050'E	(-1)			
26	HDIB318_0	15/10/2017	07:56:28	2034	35_18.69350'N	142_29.47283'E	811	40.5	298.978	Distance (50.0m)
		15/10/2017	08:05:12	2010	35_18.96550'N	142_28.75017'E				
		15/10/2017	13:13:14	1200	35_29.83450'N	142_05.51783'E				
		15/10/2017	13:13:14	1200	35_29.83450'N	142_05.51783'E	(-1)			
							Total	22590	1148.5	

*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.

Acknowledgement

We would like to thank the captain Eiko Ukekura and his crew of the R/V Yokosuka, and Hidenori Shibata and the marine technician team (Nippon Marine Enterprises, Ltd.) for their safe operation and great support during the cruise. We are grateful to member of CEAT (R&D Center for Earthquake and Tsunami), and MARITEC (Marine Technology Center) at JAMSTEC for their help on this cruise. Figures are produced with “The Generic Mapping Tools” (Wessel and Smith, 1991).