



R/V Yokosuka Cruise Report YK18-12

Research on the past history of mega-thrust shallow slip;
Marine Geological and Geophysical surveys to investigate
the nature of subduction zone mega earthquakes and
tsunamis

Kuril Trench

Aug.30,2018-Sep.16,2018

Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

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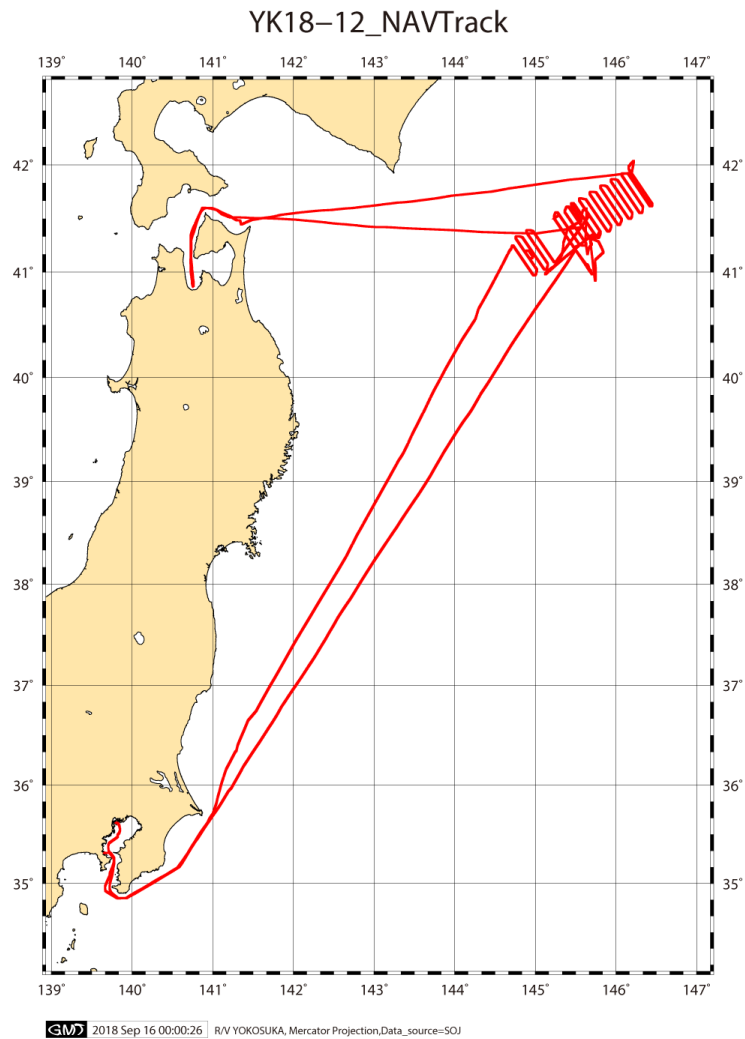
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1. Cruise Information

- Cruise ID: YK18-12
- Name of vessel: R/V Yokosuka
- Title of cruise: Research on the past history of mega-thrust shallow slip; Marine Geological and Geophysical surveys to investigate the nature of subduction zone mega earthquakes and tsunamis
- Chief Scientist [Affiliation]: Yasuyuki Nakamura [JAMSTEC]
- Cruise period: 30 August 2018 – 16 September 2018
- Ports of departure / call / arrival: Tokyo (Ariake) – Yokosuka (JAMSTEC)
- Research area: Kuril Trench
- Research map



2. Research Proposal and Science Party

- Title of proposal: Research on the past history of mega-thrust shallow slip; Marine Geological and Geophysical surveys to investigate the nature of subduction zone mega earthquakes and tsunamis
- Representative of Science Party [Affiliation]: Shuichi Kodaira
- Science Party (Proponents) [Affiliation]
 - Shuichi KODAIRA [JAMSTEC]
 - Seiichi MIURA [JAMSTEC]

Yasuyuki NAKAMURA [JAMSTEC]
Mikiya YAMASHITA [JAMSTEC]
Yuka KAIHO [JAMSTEC]
Gou FUJIE [JAMSTEC]
Ayako NAKANISHI [JAMSTEC]
Tetsuo NO [JAMSTEC]
Ryuta ARAI [JAMSTEC]
Koichiro OBANA [JAMSTEC]
Tsutomu TAKAHASHI [JAMSTEC]
Yojiro YAMAMOTO [JAMSTEC]
Toshiya KANAMATSU [JAMSTEC]

- Onboard Science Party [Affiliation, assignment etc.]

Yasuyuki Nakamura [JAMSTEC]: Chief Scientist
Mikiya Yamashita [JAMSTEC]: Associate Chief Scientist
Akie Suzuki [Nippon Marine Enterprises Ltd.]: Chief Marine Technician
Shusuke Machida [Nippon Marine Enterprises Ltd.]: Marine Technician
Keita Suzuki [Nippon Marine Enterprises Ltd.]: Marine Technician
Yoshiki Horiuchi [Nippon Marine Enterprises Ltd.]: Marine Technician
Kimiko Serizawa [Nippon Marine Enterprises Ltd.]: Marine Technician
Ryo Miura [Nippon Marine Enterprises Ltd.]: Marine Technician
Mitsuteru Kuno [Nippon Marine Enterprises Ltd.]: Marine Technician

3. Research/Development Activities

●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 Kuril Trench axis area off Hokkaido 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 37.5 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

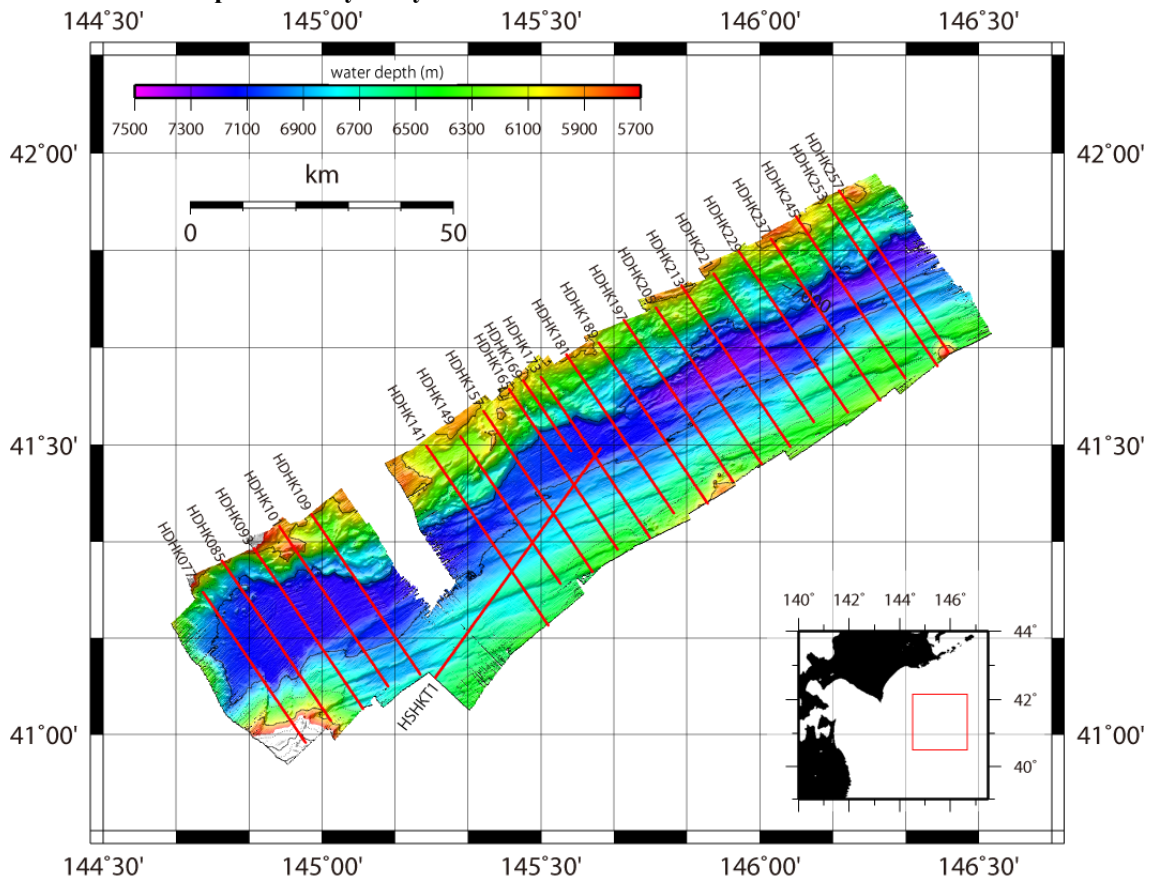
PMCS system (192 channel streamer cable, maximum offset ~1.3 km)

Cluster gun (40 inch³ x2, 150 inch³ x2)

EM 122

XCTD

3.4 MCS Line Map with bathymetry data



3.5 MCS Line list

NO.	LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P.	VESSEL POSITION		NUMBER OF SHOTS FGSP - LGSP (Increment)	LENGTH FGSP - LGSP (km)	DIRECTION (°)	Mode (m)
				F.G.S.P.						
				L.G.S.P.						
				L.S.P.	Lat.	Lon.				
1	HDHK077_0	2018/09/13	23:43:32	1991	40_59.16650'N	144_57.67183'E	908 - 1	34.0	327.179	Distance (37.5m)
		2018/09/13	23:52:26	1967	40_59.56267'N	144_57.30017'E				
		2018/09/14	05:59:57	1060	41_14.75317'N	144_43.63000'E				
		2018/09/14	05:59:57	1060	41_14.75317'N	144_43.63000'E				
2	HDHK085_0	2018/09/13	13:14:21	969	41_17.96817'N	144_46.26867'E	494 1	18.5	147.149	Distance (37.5m)
		2018/09/13	13:21:56	993	41_17.56633'N	144_46.63083'E				
		2018/09/13	15:54:17	1486	41_09.31367'N	144_54.07950'E				
		-	-	1529	-	-				
3	HDHK085_1	2018/09/13	19:25:24	1423	41_10.37483'N	144_53.14550'E	506 1	18.9	147.149	Distance (37.5m)
		2018/09/13	19:35:00	1454	41_09.85117'N	144_53.60450'E				
		2018/09/13	22:06:52	1959	41_01.38417'N	145_01.19433'E				
		2018/09/13	22:06:52	1959	41_01.38417'N	145_01.19433'E				
4	HDHK093_0	2018/09/13	04:02:22	1991	41_02.69333'N	145_05.53383'E	986 - 1	36.9	327.117	Distance (37.5m)
		2018/09/13	04:05:47	1985	41_02.79733'N	145_05.45067'E				
		2018/09/13	11:24:37	1000	41_19.30417'N	144_50.60267'E				
		2018/09/13	11:24:37	1000	41_19.30417'N	144_50.60267'E				
5	HDHK101_0	2018/09/12	20:50:51	969	41_21.51317'N	144_54.14133'E	975 1	36.5	147.088	Distance (37.5m)
		2018/09/12	20:56:13	986	41_21.22350'N	144_54.39333'E				
		2018/09/13	01:39:21	1960	41_04.90383'N	145_09.08633'E				
		2018/09/13	01:39:21	1960	41_04.90383'N	145_09.08633'E				
6	HDHK109_0	2018/09/12	13:05:29	1991	41_06.23550'N	145_13.41867'E	968 - 1	36.3	327.056	Distance (37.5m)
		2018/09/12	13:15:12	1967	41_06.64367'N	145_13.06817'E				
		2018/09/12	19:11:21	1000	41_22.84417'N	144_58.46983'E				
		2018/09/12	19:11:21	1000	41_22.84417'N	144_58.46983'E				
7	HDHK141_0	2018/09/01	07:55:43	2108	41_11.35350'N	145_30.94250'E	1085	40.7	326.936	Distance
		2018/09/01	08:03:20	2084	41_11.74800'N	145_30.56367'E				

		2018/09/01	13:50:09	1000	41_29.92850'N	145_14.20700'E				(37.5m)			
		2018/09/01	13:50:09	1000	41_29.92850'N	145_14.20700'E	- 1						
8	HDHK149_0	2018/09/01	16:04:37	1049	41_30.79683'N	145_18.96650'E	886	33.2	146.903	Distance (37.5m)			
		2018/09/01	16:13:16	1073	41_30.40117'N	145_19.34383'E							
		2018/09/01	20:52:29	1958	41_15.56200'N	145_32.70967'E	1						
		2018/09/01	20:52:48	1959	41_15.54467'N	145_32.72583'E							
9	HDHK157_0	2018/09/01	22:17:41	1990	41_16.86550'N	145_37.03283'E	967	36.2	326.874	Distance (37.5m)			
		2018/09/01	22:25:12	1966	41_17.26617'N	145_36.66817'E							
		2018/09/02	03:32:03	1000	41_33.47450'N	145_22.08917'E	- 1						
		2018/09/02	03:32:03	1000	41_33.47450'N	145_22.08917'E							
10	HDHK165_0	2018/09/02	05:12:15	969	41_35.68150'N	145_25.63200'E	556	20.8	146.840	Distance (37.5m)			
		2018/09/02	05:20:40	993	41_35.27767'N	145_25.99233'E							
		2018/09/02	08:30:14	1548	41_25.97000'N	145_34.38733'E	1						
		2018/09/02	08:30:14	1548	41_25.97000'N	145_34.38733'E							
11	HDHK165_1	2018/09/09	22:56:40	1470	41_27.28317'N	145_33.21867'E	472	17.7	146.840	Distance (37.5m)			
		2018/09/09	23:03:33	1487	41_27.00917'N	145_33.49500'E							
		2018/09/10	01:45:47	1958	41_19.08883'N	145_40.56867'E	1						
		2018/09/10	01:45:47	1958	41_19.08883'N	145_40.56867'E							
12	HDHK169_0	2018/09/09	19:39:25	969	41_36.56667'N	145_27.59533'E	413	15.5	146.828	Distance (37.5m)			
		2018/09/09	19:47:58	993	41_36.16067'N	145_27.95183'E							
		2018/09/09	22:17:59	1405	41_29.25817'N	145_34.20000'E	1						
		2018/09/09	22:17:59	1405	41_29.25817'N	145_34.20000'E							
13	HDHK173_0	2018/09/09	12:56:20	1989	41_20.41750'N	145_44.89300'E	966	36.2	326.813	Distance (37.5m)			
		2018/09/09	13:04:01	1965	41_20.82483'N	145_44.53817'E							
		2018/09/09	18:15:30	1000	41_37.00983'N	145_29.95017'E	- 1						
		2018/09/09	18:15:30	1000	41_37.00983'N	145_29.95017'E							
14	HDHK181_0	2018/09/09	05:38:08	969	41_39.22683'N	145_33.50500'E	540	20.2	146.780	Distance (37.5m)			
		2018/09/09	05:47:15	993	41_38.81950'N	145_33.86333'E							
		2018/09/09	08:59:40	1532	41_29.77633'N	145_42.02000'E	1						
		-	-	1591	-	-							
15	HDHK181_1	2018/09/09	09:35:08	1631	41_28.11367'N	145_43.51250'E	314	11.7	146.780	Distance			
		2018/09/09	09:35:08	1631	41_28.11367'N	145_43.51250'E							

		2018/09/09	11:17:28	1944	41_22.86333'N	145_48.23533'E				(37.5m)
		-	-	1946	-	-	1			
16	HDHK181_2	2018/09/12	00:24:53	1858	41_24.38267'N	145_46.85567'E	366	13.7	326.780	Distance (37.5m)
		2018/09/12	00:34:03	1834	41_24.78650'N	145_46.49483'E				
		2018/09/12	02:32:33	1469	41_30.92183'N	145_41.00333'E				
		2018/09/12	02:32:33	1469	41_30.92183'N	145_41.00333'E				
17	HDHK189_0	2018/09/08	22:40:11	1989	41_23.96017'N	145_52.77783'E	965	36.2	326.751	Distance (37.5m)
		2018/09/08	22:48:27	1964	41_24.37950'N	145_52.39900'E				
		2018/09/09	03:57:44	1000	41_40.55717'N	145_37.82767'E				
		2018/09/09	03:57:44	1000	41_40.55717'N	145_37.82767'E				
18	HDHK197_0	2018/09/08	15:52:38	969	41_42.77150'N	145_41.38083'E	966	36.2	146.719	Distance (37.5m)
		2018/09/08	16:01:10	993	41_42.36150'N	145_41.72833'E				
		2018/09/08	21:15:56	1958	41_26.16250'N	145_56.31950'E				
		2018/09/08	21:15:56	1958	41_26.16250'N	145_56.31950'E				
19	HDHK205_0	2018/09/08	09:29:03	1959	41_28.00650'N	146_00.21317'E	936	35.1	326.690	Distance (37.5m)
		2018/09/08	09:36:32	1935	41_28.40283'N	145_59.83850'E				
		2018/09/08	14:06:30	1000	41_44.10850'N	145_45.71950'E				
		2018/09/08	14:06:30	1000	41_44.10850'N	145_45.71950'E				
20	HDHK213_0	2018/09/08	02:44:58	969	41_46.31867'N	145_49.25983'E	966	36.2	146.657	Distance (37.5m)
		2018/09/08	02:52:35	993	41_45.90850'N	145_49.61333'E				
		2018/09/08	07:47:58	1958	41_29.70617'N	146_04.20583'E				
		2018/09/08	07:47:58	1958	41_29.70617'N	146_04.20583'E				
21	HDHK221_0	2018/09/07	20:32:51	1911	41_32.34917'N	146_07.36517'E	882	33.0	326.626	Distance (37.5m)
		2018/09/07	20:42:00	1881	41_32.84983'N	146_06.90650'E				
		2018/09/08	01:01:19	1000	41_47.64250'N	145_53.57750'E				
		2018/09/08	01:01:19	1000	41_47.64250'N	145_53.57750'E				
22	HDHK229_0	2018/09/07	13:00:32	969	41_49.85217'N	145_57.11850'E	965	36.2	146.597	Distance (37.5m)
		2018/09/07	13:08:32	993	41_49.45467'N	145_57.49217'E				
		2018/09/07	18:32:38	1957	41_33.25967'N	146_12.06617'E				
		2018/09/07	18:32:38	1957	41_33.25967'N	146_12.06617'E				
23	HDHK237_0	2018/09/07	06:06:24	1988	41_34.58967'N	146_16.39667'E	967	36.2	326.564	Distance
		2018/09/07	06:12:53	1966	41_34.95750'N	146_16.06117'E				

		2018/09/07	11:15:23	1000	41_51.18733'N	146_01.45117'E	- 1			(37.5m)
		2018/09/07	11:15:23	1000	41_51.18733'N	146_01.45117'E				
24	HDHK245_0	2018/09/06	22:35:34	969	41_53.39733'N	146_04.99350'E	965	36.2	146.535	Distance (37.5m)
		2018/09/06	22:43:09	993	41_52.99033'N	146_05.35200'E				
		2018/09/07	04:21:14	1957	41_36.79150'N	146_19.93200'E	1			
		2018/09/07	04:21:14	1957	41_36.79150'N	146_19.93200'E				
25	HDHK253_0	2018/09/06	16:10:52	1988	41_38.12783'N	146_24.27533'E	965	36.2	326.504	Distance (37.5m)
		2018/09/06	16:18:13	1964	41_38.52617'N	146_23.90250'E				
		2018/09/06	21:09:01	1000	41_54.73167'N	146_09.32817'E	- 1			
		2018/09/06	21:09:01	1000	41_54.73167'N	146_09.32817'E				
26	HDHK257_0	2018/09/06	09:05:43	969	41_56.05067'N	146_10.89133'E	965	36.2	146.486	Distance (37.5m)
		2018/09/06	09:13:53	993	41_55.65250'N	146_11.26500'E				
		2018/09/06	14:42:52	1957	41_39.44867'N	146_25.84933'E	1			
		2018/09/06	14:42:52	1957	41_39.44867'N	146_25.84933'E				
27	HSHKT1_0	2018/09/12	03:21:59	1130	41_29.57250'N	145_38.13817'E	1436	53.8	218.917	Distance (37.5m)
		2018/09/12	03:24:47	1139	41_29.42250'N	145_38.00067'E				
		2018/09/12	12:26:14	2574	41_05.83750'N	145_15.44917'E	1			
		2018/09/12	12:26:14	2574	41_05.83750'N	145_15.44917'E				
Total						22380	838.2			

*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. Cruise Log

Date	Log
08/30/2018	Departure from Tokyo, transit to survey area
08/31/2018	Transit to survey area
09/01/2018	Arrival at survey area, XCTD, MCS Line HDHK141
09/02/2018	MCS Lines HDHK149, HDHK157, HDHK165, transit to Aomori bay
09/03/2018	Stay at Aomori bay for typhoon evacuation
09/04/2018	Stay at Aomori bay for typhoon evacuation
09/05/2018	Stay at Aomori bay for typhoon evacuation, transit to survey area
09/06/2018	Transit to survey area, XCTD, MCS Line HDHK257
09/07/2018	MCS Lines HDHK253, HDHK245, HDHK237, HDHK229
09/08/2018	MCS Lines HDHK221, HDHK213, HDHK205
09/09/2018	MCS Lines HDHK197, HDHK189, HDHK181, HDHK173
09/10/2018	MCS Lines HDHK169, HDHK165, wait on weather off Hokkaido
09/11/2018	Wait on weather off Hokkaido
09/12/2018	Wait on weather, MCS Lines HDHK181, HSHKT1, HDHK109
09/13/2018	MCS Lines HDHK101, HDHK093
09/14/2018	MCS Lines HDHK085, HDHK077, transit to Yokosuka
09/15/2018	Transit to Yokosuka
09/16/2018	Arrival at Yokosuka

● 5. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.
This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.
Users of information on this report are requested to submit Publication Report to JAMSTEC.

<http://www.godac.jamstec.go.jp/darwin/explain/1/e#report>
E-mail: submit-rv-cruise@jamstec.go.jp

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JAMSTEC for their help on this cruise. Figures are produced with “The Generic Mapping Tools” (Wessel and Smith, 1991).