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R/V KAIMEI Cruise Report
KM17-06C

Integrated Research Project on Seismic and Tsunami Hazards Around the Off northwestern Hokkaido, Japan Sea

Jun.22 - Jul.11,2017

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

Contents:

1. Cruise Information:

(1) **Cruise ID, Ship name:** KM17-06C, R/V *KAIMEI*

(2) **Title of the cruise:** 2017 FY "Integrated Research Project on Seismic and Tsunami Hazards Around the Sea of Japan"

(3) **Title of proposal:**

Integrated Research Project on Seismic and Tsunami Hazards Around the Sea of Japan

(4) **Cruise period, Port call:** Jun. 22 – Jul. 11, 2017, Otaru port to Hakodate port

(5) **Research Area:** Off northwestern Hokkaido, Japan Sea

(6) **Research Map:** Fig. 1

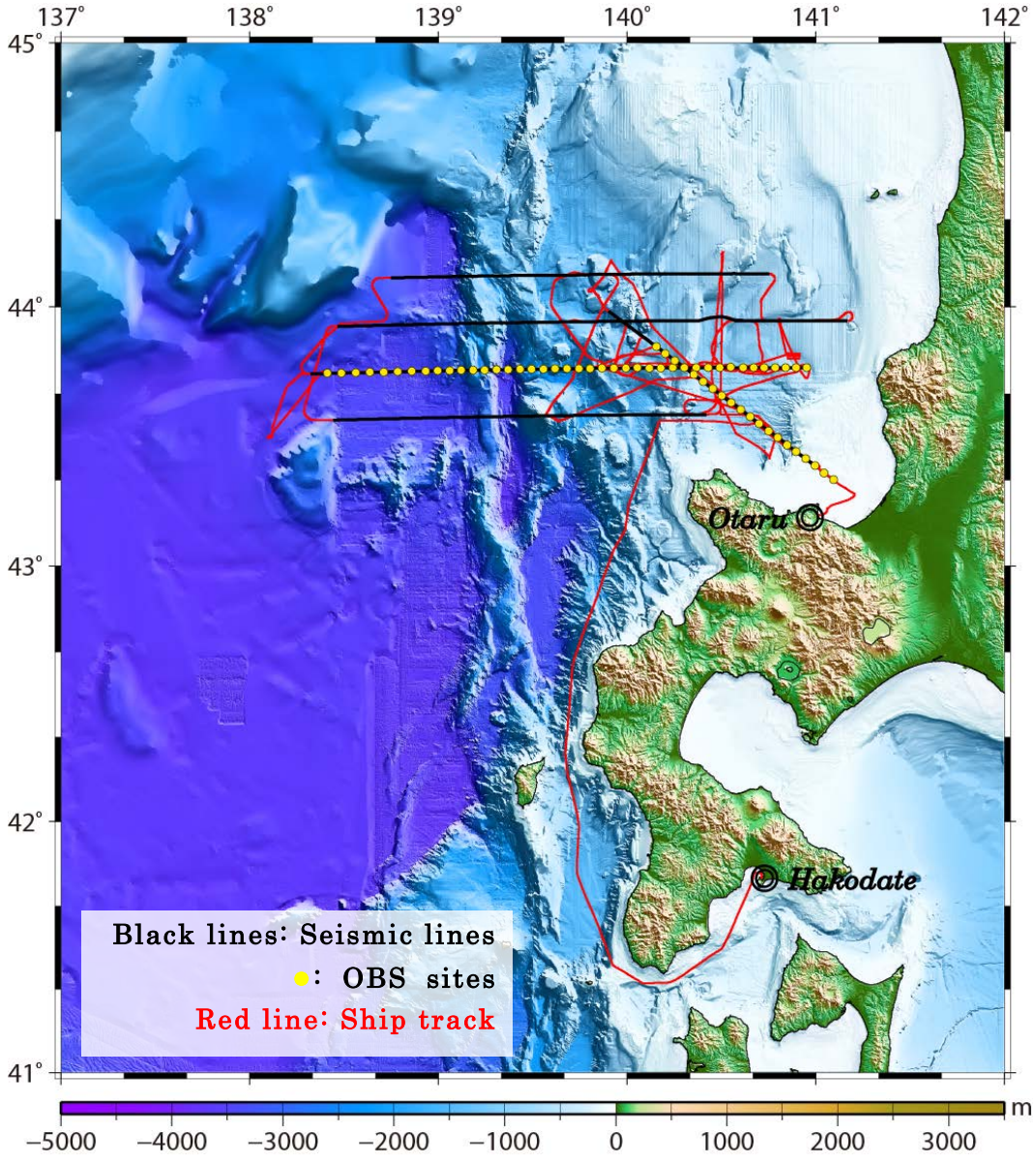

Fig. 1 Ship track during KM17-06C cruise.

2. Researchers:

(1) Chief Scientists [Affiliation]:

Tetsuo NO [R&D Center for Earthquake and Tsunami (CEAT)/JAMSTEC]

(2) Representative of Science Party [Affiliation]:

Shuichi KODAIRA [CEAT/JAMSTEC]

(3) KM17-06C Shipboard Science Party:

Tetsuo NO [CEAT/JAMSTEC]: Chief Scientist
Takeshi SATO [CEAT/JAMSTEC]: Vice-chief Scientist
Makoto ITO [Nippon Marine Enterprises, Ltd. (NME)]: Chief marine technician
Yuki OHWATARI [NME]: Marine technician
Yuta WATARAI [NME]: Marine technician
Hikaru IWAMARU [NME]: Marine technician
Waka KOMATSU [NME]: Marine technician
Akie SUZUKI [NME]: Marine technician
Kaoru TAKIZAWA [NME]: Marine technician
Naoto NOGUCHI [NME]: Marine technician
Norio SHIMOMURA [NME]: Marine technician
Takuya MAEKAWA [NME]: Marine technician
Seiichi MORI [NME]: Marine technician
Yasushi HASHIMOTO [NME]: Marine technician
Miki TAWATA [NME]: Marine technician
Satoshi SHIMIZU [NME]: Technician of Ocean Bottom Node

3. Observation:

(1) Objective:

The relationship between crustal structure and the earthquakes that have occurred along the eastern margin of the Japan Sea has been revealed recently by seismic survey as part of the research project "Multidisciplinary research project for construction of fault model in the high strain rate zone" (Sato et al., 2014; No et al., 2014). However, other areas in the Japan Sea have not yet been conducted to seismic survey for study of the crustal structure. Therefore, we have participated in "Integrated Research Project on Seismic and Tsunami Hazards Around the Sea of Japan" conducted by the MEXT of Japan; in particular, we have performed seismic surveys in the Japan Sea since 2014.

In June-July 2017, we conducted a marine seismic survey to study the crustal structure around the area off northwestern Hokkaido. The survey covered the areas from the continental shelf to the Japan Basin. This survey area covers the rupture zone of the 1940 Shakotan-Oki earthquake (M_J 7.5), and active faults are estimated to be striking a north–south or northeast-southwest trend from the western coast of the Hokkaido to the Okushiri Ridge (e.g. Okamura, 2010). In addition, since our survey line connected to the land seismic survey line of the Earthquake Research Institute (the University of Tokyo) which was located on the southeast extension, we are able to obtain the crustal structure imaging of onshore-offshore seismic profile by further data analysis. This seismic survey used the R/V *KAIMEI*. Since the receiver interval and common midpoint interval of the *KAIMEI* seismic system are 1/2 to 1/4 times as narrow as those of general multichannel seismic reflection systems, seismic data of the *KAIMEI* system should operate effectively for processing waveform data of spatial direction, such as the suppression of spatial aliasing, migration, and velocity filter, if we acquire good quality data.

(2) List of observation instruments:

1) Multichannel seismic reflection (MCS) survey (Fig.2):

MCS data were acquired along 5 lines (SJ1705, SJ1706, SJ1707, SJ1708, and SJ17IS) with a total length of approximately 838 km. Some seismic lines were crooked to avoid the fishing operations and equipment in the survey area.

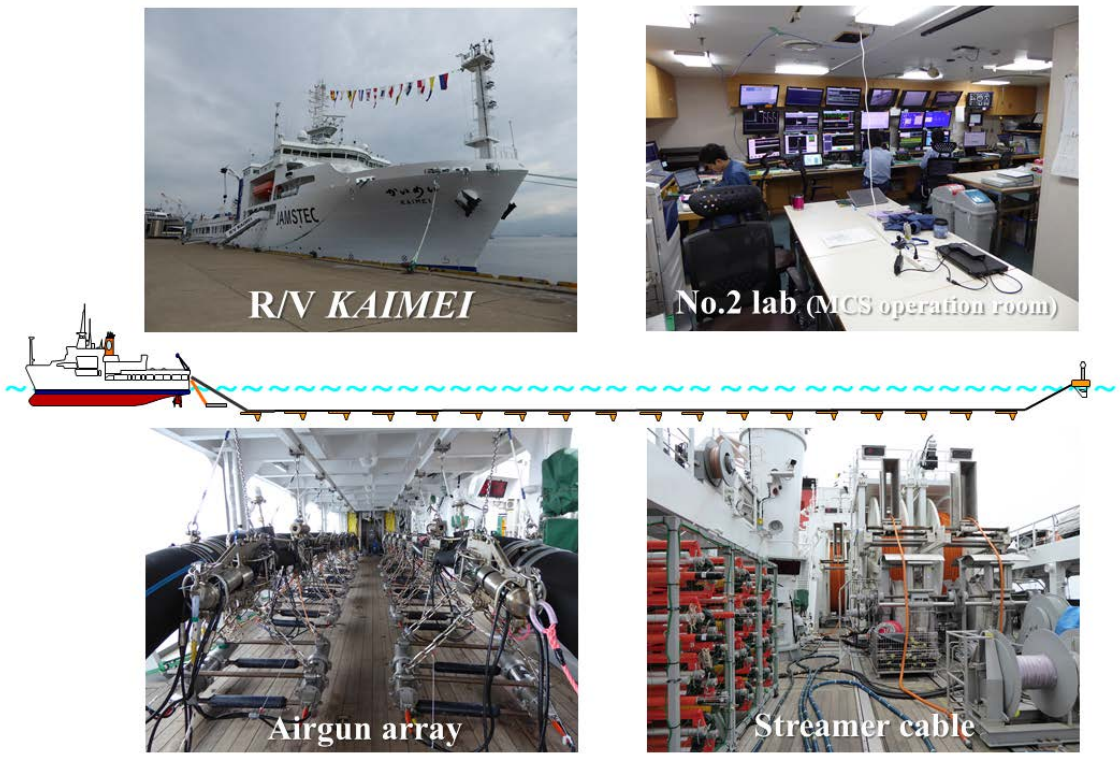

Fig. 2 MCS system on R/V *KAIREI*.

a) Source:

To obtain good quality MCS data, we shot an air gun array at a spacing of 50 m (SJ1705, SJ106, SJ1707, SJ1708) or 25 m (SJ17IS). The tuned airgun array has a maximum total volume of 5,300 cubic inches (about 87 liters), and consists of 22 airguns (Bolt Long Life Air Gun). The standard air pressure was 2,000 psi (about 14 MPa). During the experiment, the air gun array depth was kept at 10 m below the sea surface. Since towing geometry of the MCS system differs depending on survey lines, we see more information about towing geometry in Figs.3 and 4 .

b) Receiver:

During airgun shooting, we towed a hydrophone streamer cable with a group interval of 3.125 m. (SSCT Solid Streamer, Hydroscience Technologies, Inc.). The signals from eight sensors in the same group (channel) were stacked before A/D conversion. The towing depth of the streamer cable was kept at 12 m below the

sea surface by the depth controller called Bird (ION DigiCOURSE streamer depth controllers).

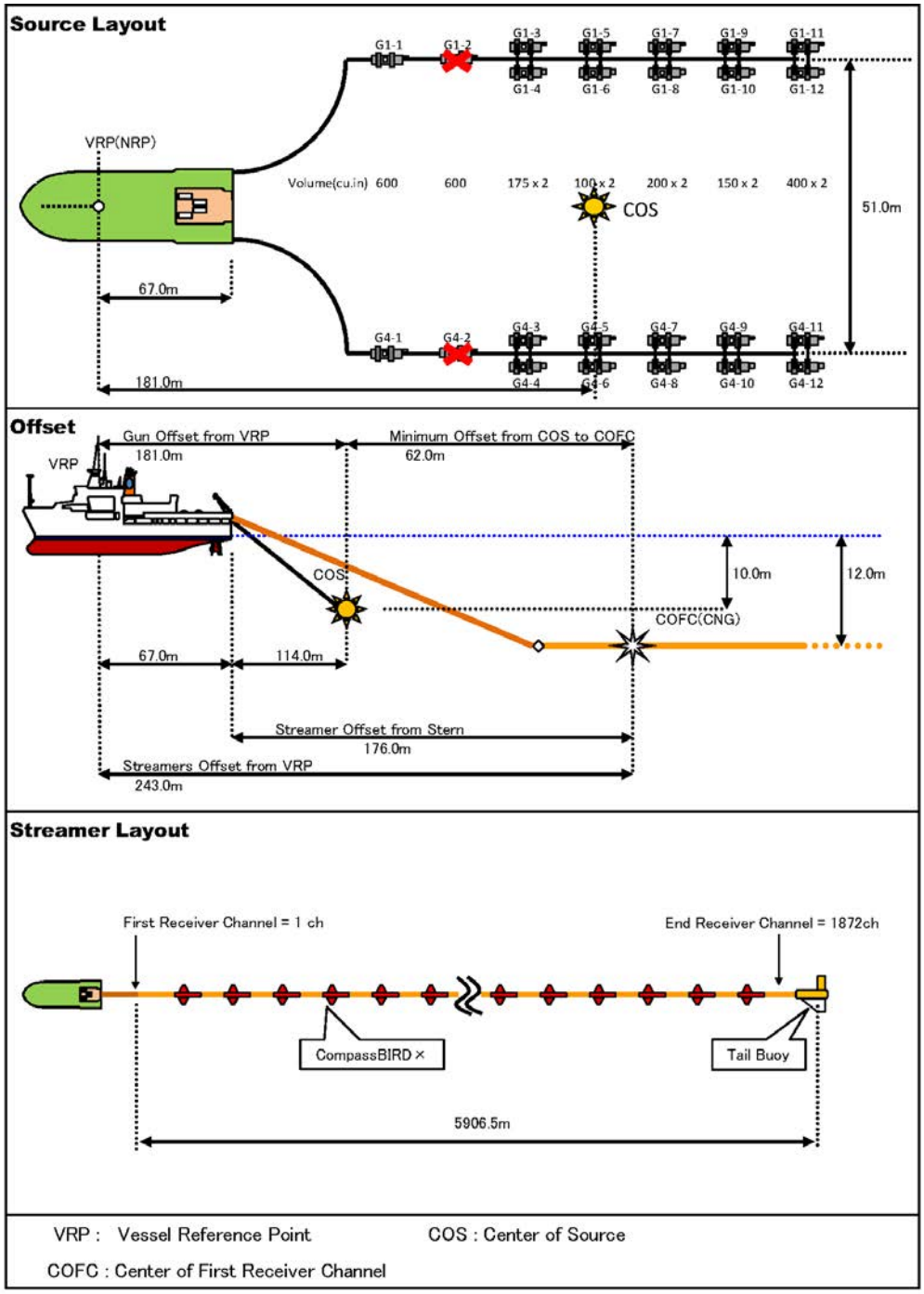

Fig. 3 Example of vessel towing geometry during the MCS survey (SJ1707 [SJ1707mcsP2]). Top figure shows the source (airgun system) layout, middle figure represents source–receiver depth and position, and navigation offsets, bottom figure is streamer cable configuration during the MCS survey.

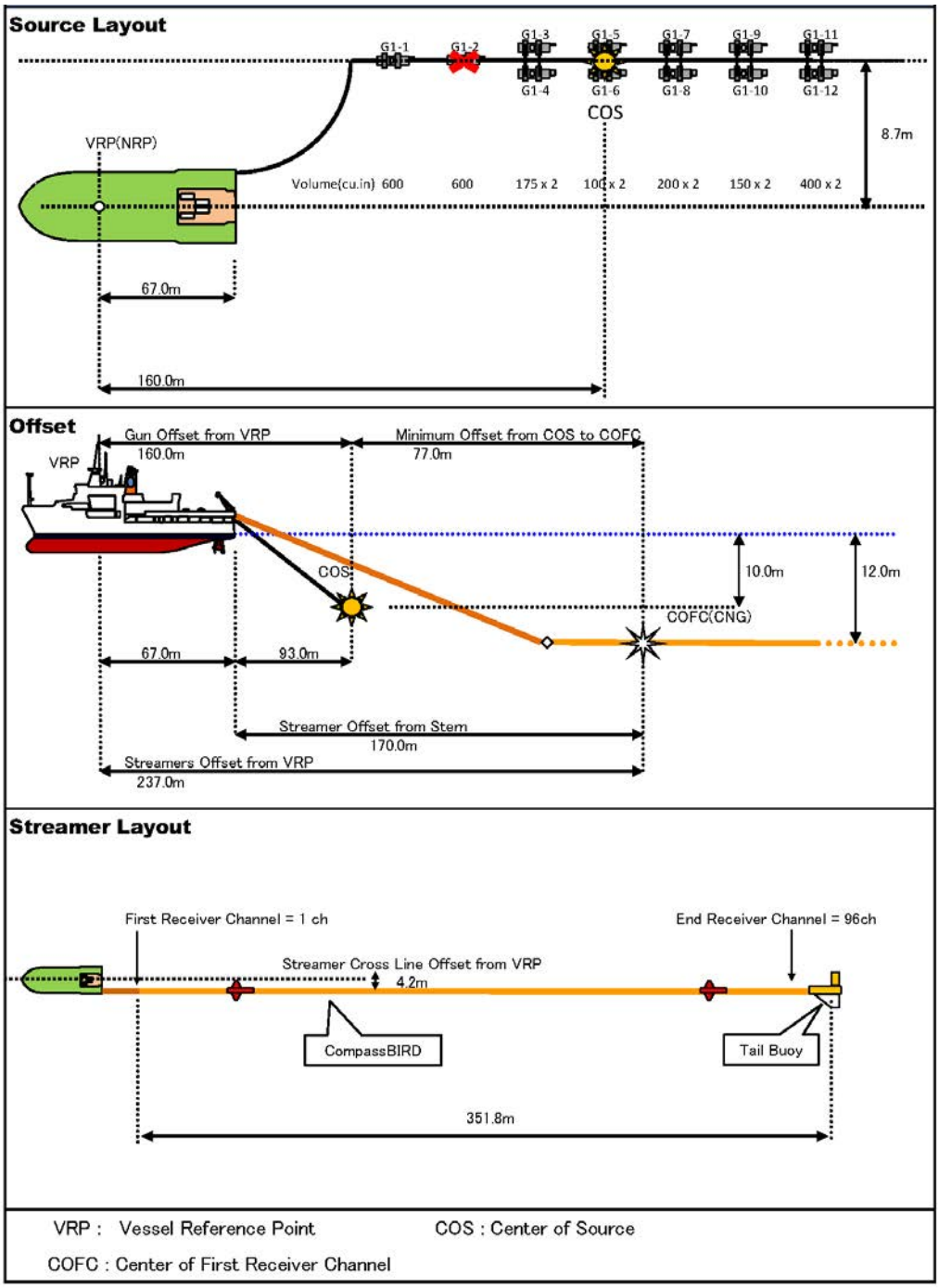

Fig. 4 Example of vessel towing geometry during the MCS survey (SJ17IS [SJ17ISmcsP1]). Top figure shows the source (airgun system) layout, middle figure represents source–receiver depth and position, and navigation offsets, bottom figure is streamer cable configuration during the MCS survey.

c) Recording and navigation systems

NTRS2 recording system, producted by Hydroscience Technologies, Inc., was used in the survey; the seismic data was collected in the SEG-D 8058 Rev.1 format. The sampling rate was 2 ms or 4ms, the system delay was set to 112ms (2ms sampling) or 178ms (4ms sampling).

The Differential Global Positioning System (DGPS) was used for positioning. We adopted NAVCOM's StarFix_G2 as the main positioning system, and used NAVCOM's StarFix_XP_2 as the backup. We used ORCA (ION) as our navigation software for the seismic data acquisition. Shot times and shot points (SPs) were set on ORCA, and then a trigger signal was sent to the recording system and the gun controller (SeaMap GunLink2500). The main navigation parameters were as follows: survey datum was WGS84; map projection was UTM; UTM zone parameter was 54N.

d) Onboard processing of MCS data:

Raw MCS reflection data were processed on board for the purpose of quality control in the study areas. Onboard data processing was conducted in the conventional processing sequence, which includes trace header edit, trace edit, common midpoint (CMP) binning with an interval of 1.5625 m, a bandpass filter, datum correction, amplitude compensation, velocity analysis, normal moveout correction, CMP stack, F-K migration, and a bandpass filter (Fig. 5).

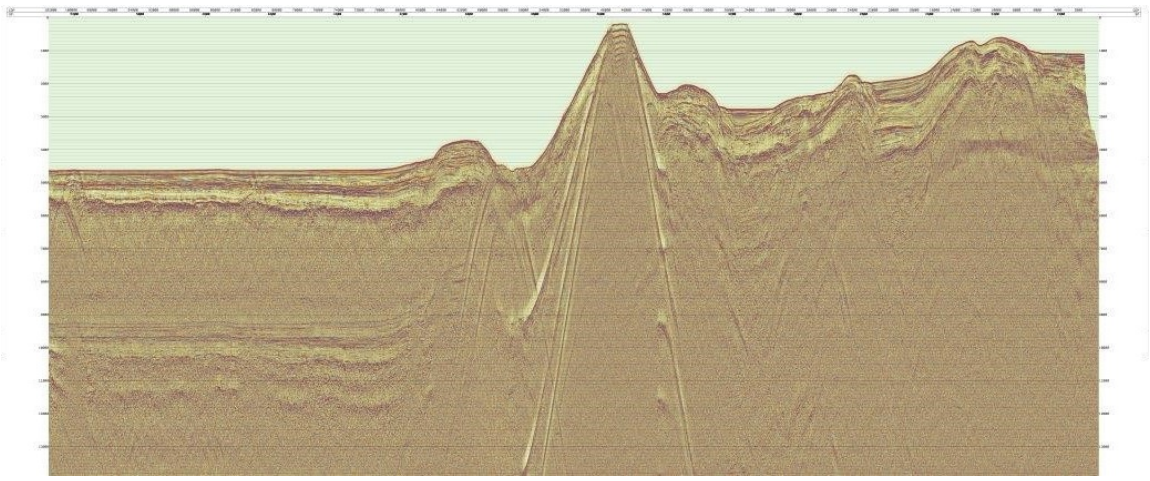

Fig. 5 Example of MCS profile with onboard processing (SJ1708).

2) Refraction survey using OBSs

We deployed 60 OBSs along the lines of SJ1707 and SJ17IS. Four types of OBS were used due to constraints by fishing activities (Tables 1 to 4) . Source parameters (e.g. shot interval, total volume) and configuration are different in these lines (Figs. 6 to 8). Though an OBS (OBN [Ocean Bottom Node]) recovery of Site No. 34 was carried out the R/V *KAIMEI*, other OBSs (59 OBSs) were retrieved by other vessel (the *KAIYO MARU NO.1*). In addition, since a deployment method of OBN system is different from other OBSs, Fig. 9 shows outline of OBN system. An example of record section obtained from OBN is indicated in Fig. 10.

Type	POBS-150, Katsujima Co., LTD.
Maximum Depth	6,000 m
Dimension (w/ anchor)	120 * 100 * 52 cm
Weight (w/ anchor)	98 kg in air, 43 kg in water
Sensor	Three-component Geophone [One vertical and two horizontal components, Natural frequency: 4.5Hz, Sensitivity:0.8V/inch/s (OPEN)] & Hydrophone
Recorder	DAT4, Clover Tech Ltd.
Recording System	Sampling continuously (Timer control is possible for start time)
Sampling Rate	24 bit, 250Hz
Power	Lithium Ion Rechargeable Battery
Acoustic Communication & Release System	Electric corrosion method
Attached Parts	Weight, Flush light, Radio beacon
Pressure Resistant Container	17 inch glass sphere

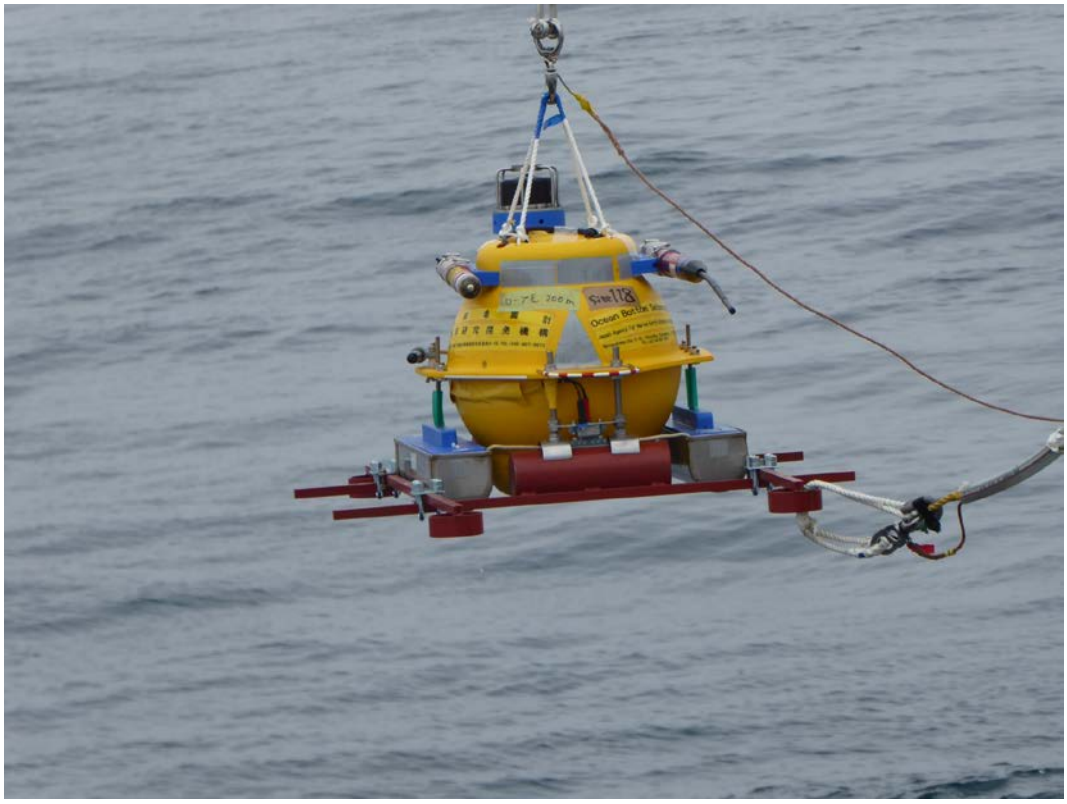

Table 1　Specifications of OBS of Katsushima type [Anchor retrieve type] (hereinafter referred to as "Type K").

Type	TOBS-24N, TOKYO SOKUSHIN CO., LTD.
Maximum Depth	6,700 m
Dimension (w/ anchor)	120 * 65 * 50 cm
Weight (w/ anchor)	105 kg in air, 50 kg in water
Sensor	Three-component Geophone & Hydrophone [One vertical and two horizontal components, Natural frequency: 4.5Hz, Sensitivity:0.78V/cm/s (damping 0.7)]
Recorder	DTC-6710, TOKYO SOKUSHIN CO., LTD.
Recording System	Sampling continuously (Timer control is possible for start time)
Sampling Rate	24 bit, 200Hz
Power	Lithium Ion Rechargeable Battery
Acoustic Communication & Release System	Electric corrosion method
Attached Parts	Weight, Flush light, Radio beacon
Pressure Resistant Container	17 inch glass sphere

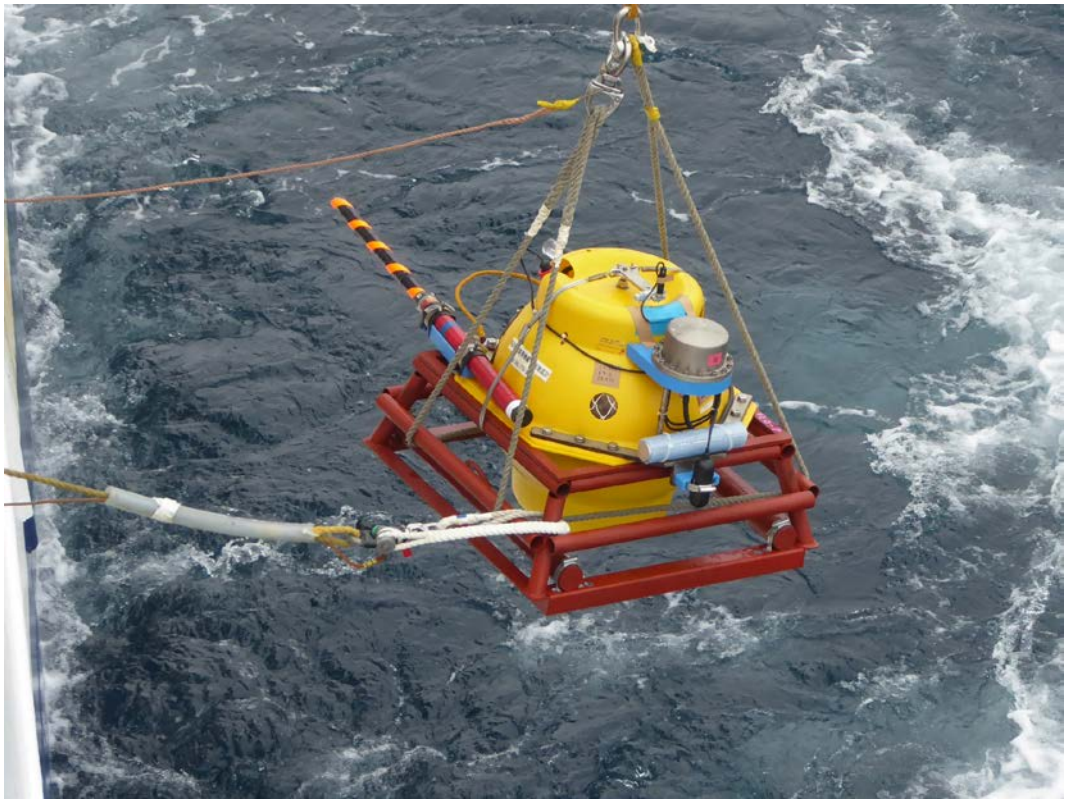

Table 2　Specifications of OBS of Tokyo Sokushin type [Normal type] (hereinafter referred to as "Type T").

Type	TOBS-24N, TOKYO SOKUSHIN CO., LTD. (Shallow water anchor type)
Maximum Depth	6,700 m
Dimension (w/ anchor)	120 * 65 * 50 cm
Weight (w/ anchor)	105 kg in air, 50 kg in water
Sensor	Three-component Geophone & Hydrophone [One vertical and two horizontal components, Natural frequency: 4.5Hz, Sensitivity: 0.78V/cm/s (damping 0.7)]
Recorder	DTC-6710, TOKYO SOKUSHIN CO., LTD.
Recording System	Sampling continuously (Timer control is possible for start time)
Sampling Rate	24 bit, 200Hz
Power	Lithium Ion Rechargeable Battery
Acoustic Communication & Release System	Electric corrosion method
Attached Parts	Weight, Flush light, Radio beacon
Pressure Resistant Container	17 inch glass sphere

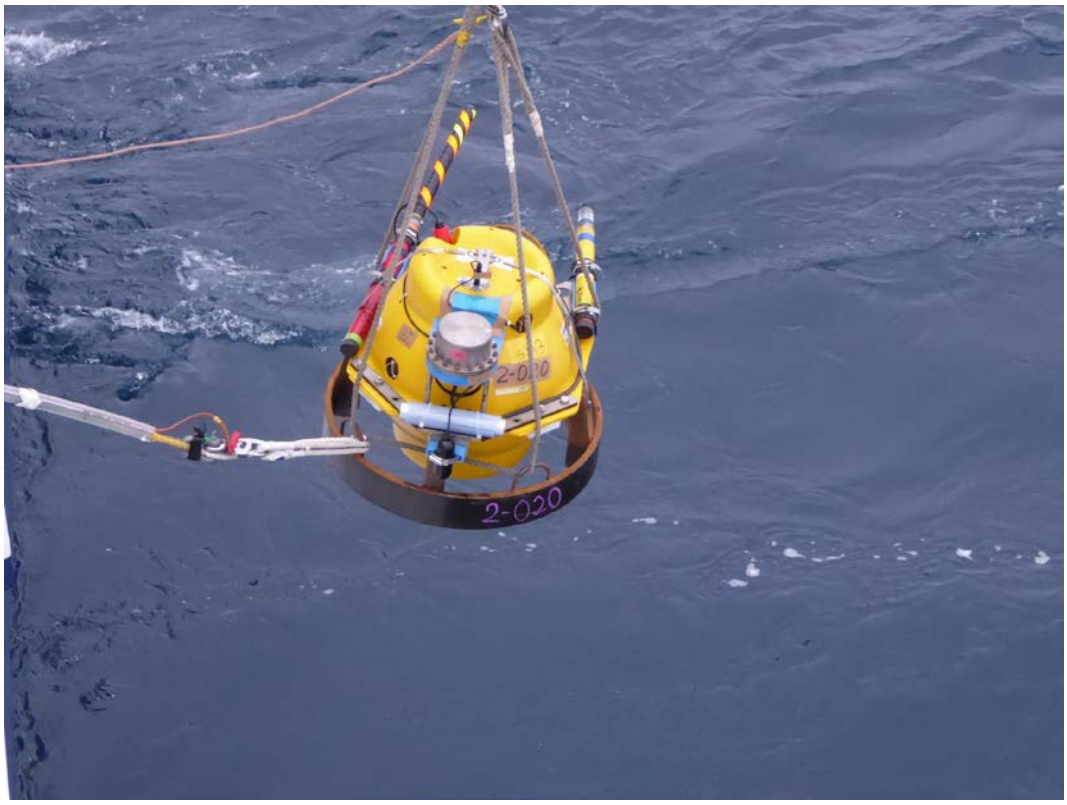

Table 3　Specifications of OBS of Tokyo Sokushin type [Shallow water anchor type] (hereinafter referred to as "Type S").

Type	OBS2G-S, Nippon Marine Enterprises Ltd.
Maximum Depth	10,000 m
Dimension (w/ anchor)	32 * 32 * 27 cm (ϕ 32 * 27 cm)
Weight (w/ anchor)	18 kg in air, 6.1 kg in water
Sensor	Three-component Geophone & Hydrophone [One vertical and two horizontal components, Natural frequency: 15Hz, Sensitivity:0.693V/m/s (damping 0.7)
Recorder	SPM II, Nippon Marine Enterprises Ltd.
Recording System	Sampling continuously (Timer control is possible for start time)
Sampling Rate	24 bit, 500Hz
Power	Lithium Ion Rechargeable Battery
Pressure Resistant Container	10 inch glass sphere

Table 4　Specifications of OBS for Ocean Bottom Node [OBN] (hereinafter referred to as "Type N").

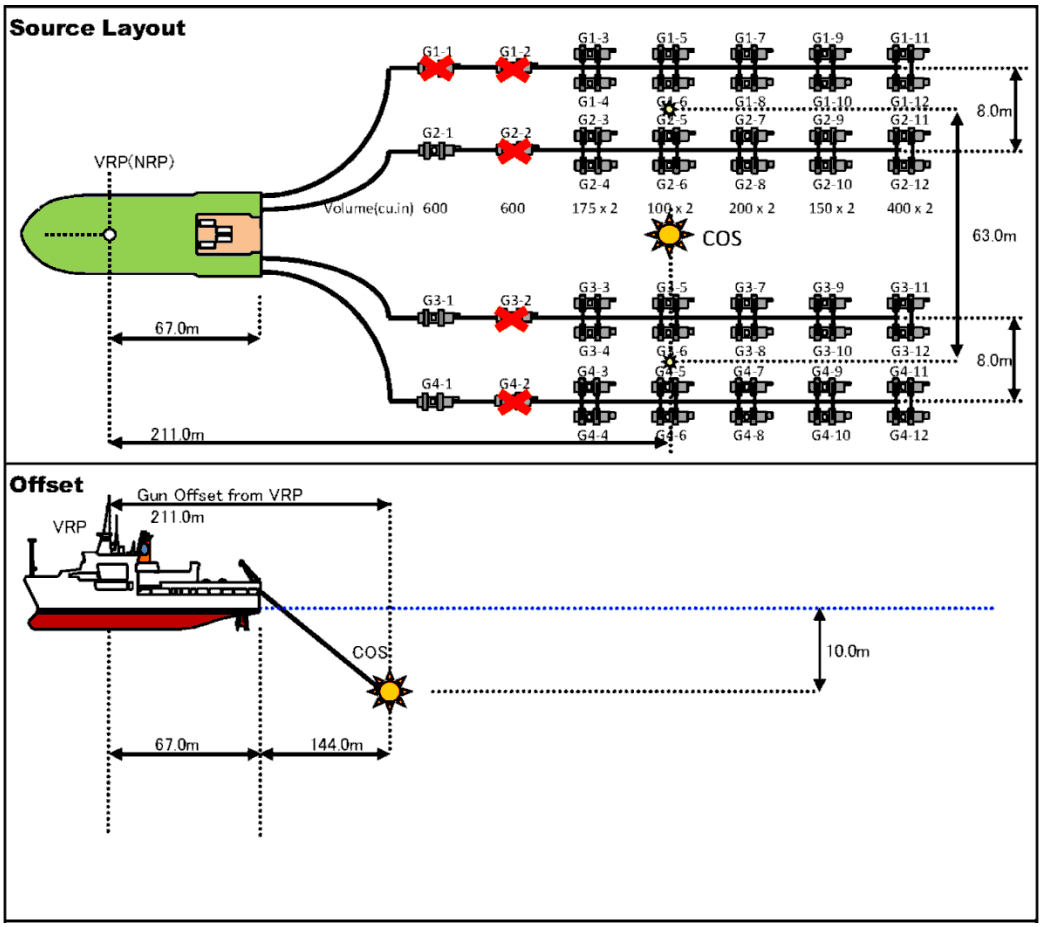

Fig. 6　Vessel towing geometry during the refraction survey of the line SJ1707. Top figure shows the source (airgun system) layout, bottom figure represents source depth and position, and navigation offsets.

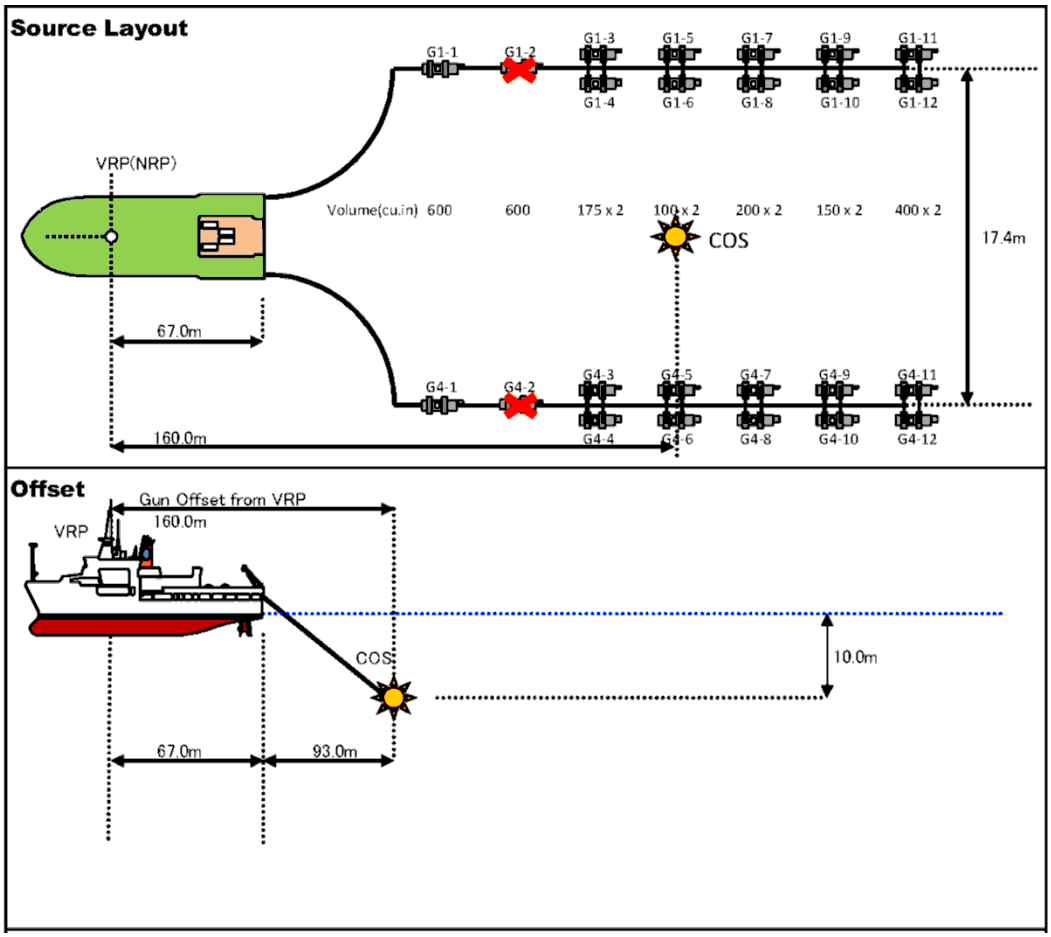

Fig. 7　Vessel towing geometry during the refraction survey of the line SJ17IS. Top figure shows the source (airgun system) layout, bottom figure represents source depth and position, and navigation offsets.

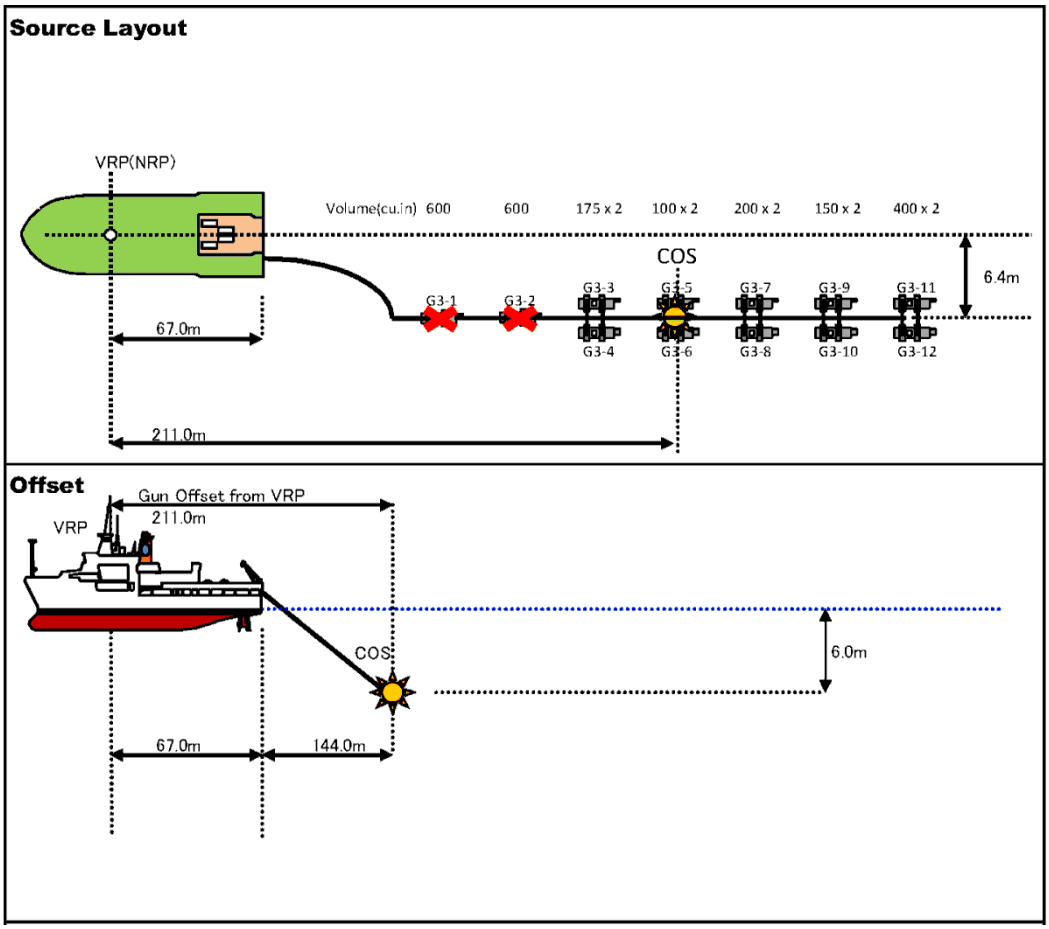

Fig. 8　Vessel towing geometry during OBN survey of the line SJ1707. Top figure shows the source (airgun system) layout, bottom figure represents source depth and position, and navigation offsets.

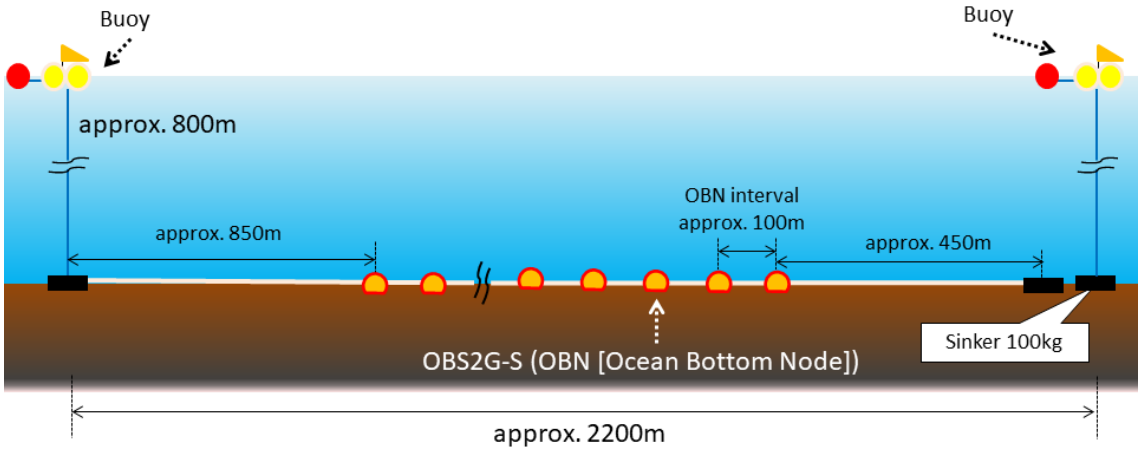

Fig. 9　Outline of OBN system (Site No. 34 in the line SJ1707).

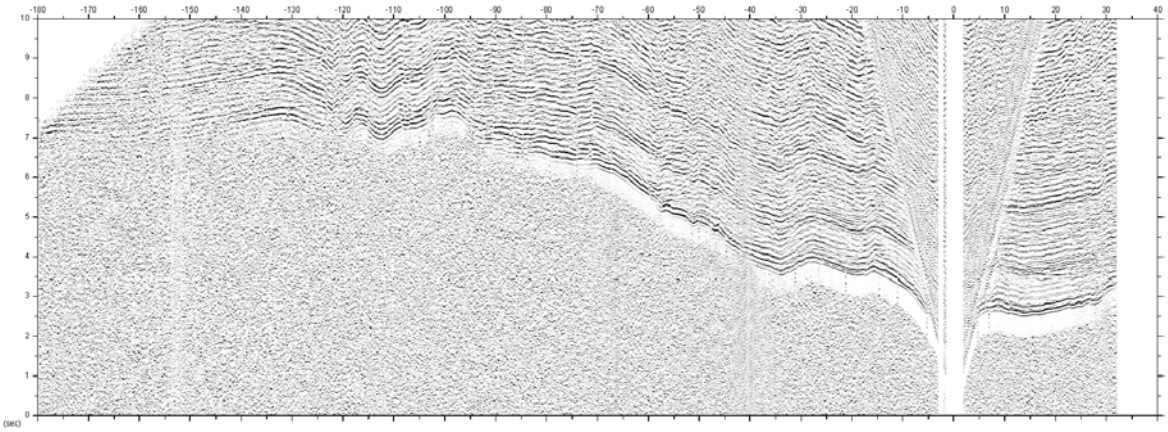

Fig. 10　Example of OBN data on the vertical component and band-pass-filtered (5–20 Hz).

3) Bathymetry, magnetic, and gravity observations

Bathymetry, magnetic, and gravity data were recorded continuously during the survey. The bathymetry survey on the R/V *KAIMEI* used a multi-narrow beam echo sounder (EM712 [shallow water type] and EM122 [Deep water type], Kongsberg) (Fig. 11). Gravity data was obtained by a shipboard gravimeter (MGS-6, Micro-g LaCoste). The magnetic survey used a three-component magnetometer (SFG-2015, Tiera Technica Corporation).

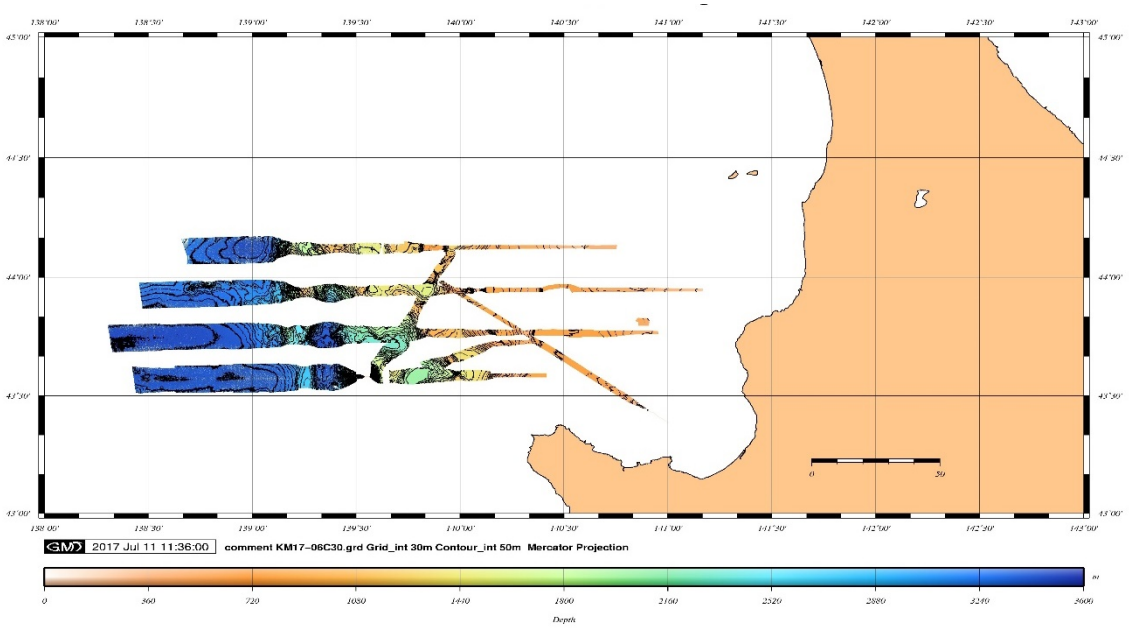

Fig. 11 Result of the bathymetric survey in this cruise.

(3) **Cruise log:** Table 5

Date		Remarks
2017/6/22	Thu	Departure from Otaru port and transit to the survey area
2017/6/23	Fri	OBS deployment.
2017/6/24	Sat	OBS deployment.
2017/6/25	Sun	OBS deployment.
2017/6/26	Mon	OBS deployment, airgun shooting (SJ1707[W to E], 200 m shot interval).
2017/6/27	Tue	Airgun shooting, retrieve airgun array system.
2017/6/28	Wed	OBS retrieval (Site#34), MCS system deployment, MCS survey (SJ1705).
2017/6/29	Thu	MCS survey (SJ1705, SJ1706).
2017/6/30	Fri	MCS survey (SJ1706, SJ1707), retrieve all equipments. Wait on weather in Ishikari Bay
2017/7/1	Sat	MCS system deployment, MCS survey (SJ1708).
2017/7/2	Sun	MCS survey (SJ1708).
2017/7/3	Mon	MCS survey (SJ1706).
2017/7/4	Tue	MCS survey (SJ1706, SJ1707).
2017/7/5	Wed	MCS survey (SJ1707).
2017/7/6	Thu	MCS survey (SJ1705), retrieve all equipments.
2017/7/7	Fri	Airgun shooting (SJ17IS)
2017/7/8	Sat	Airgun shooting (SJ18IS)
2017/7/9	Sun	MCS survey (SJ17IS), retrieve all equipments.
2017/7/10	Mon	Arrival at Hakodate port.
2017/7/11	Tue	End of KM17-06C cruise.

Table 5　Cruise log of KM17-06C.

(4) **Seismic lines** : Fig. 12

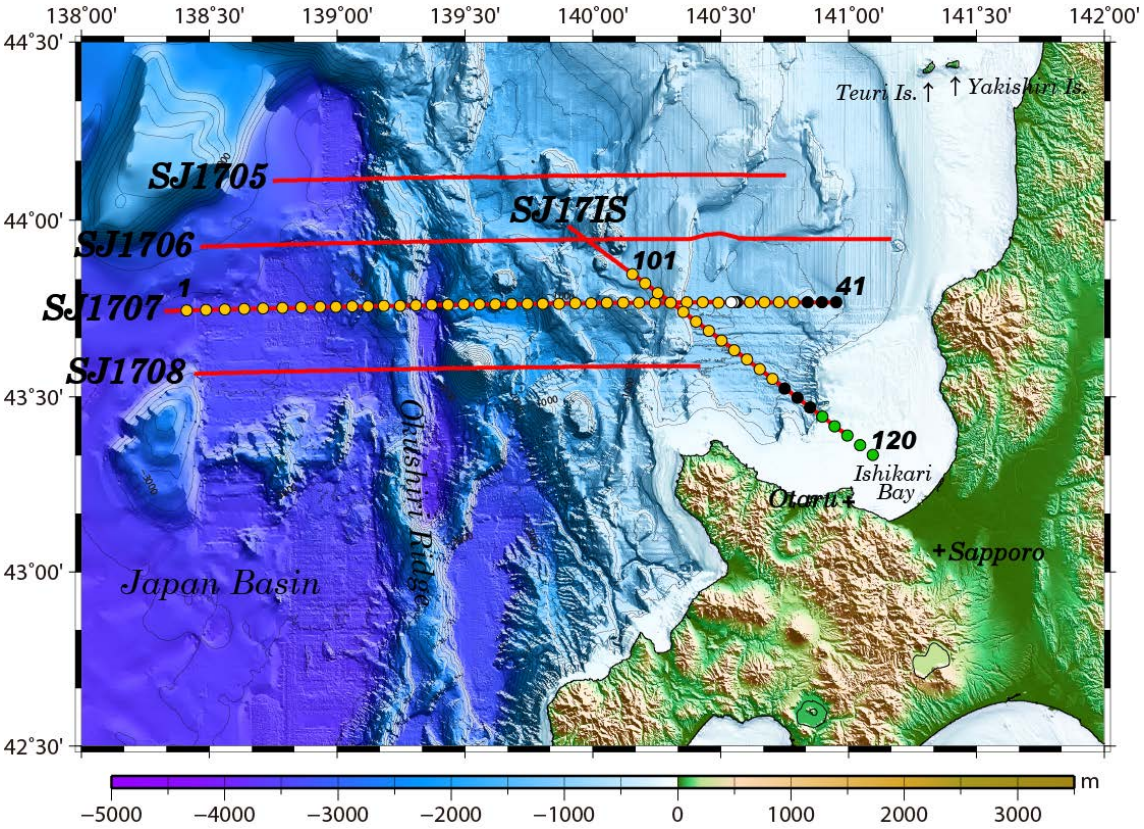

Fig. 12 Bathymetry and location maps of the survey area. Red lines are the MCS lines, and circles are the positions of the OBS sites (yellow: Type T, green: Type K, black: Type S, white: Type N).

(5) **Seismic line list:** Table 6

LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P. / F.G.S.P. / L.G.S.P. / L.S.P.	VESSEL POSITION Lat.	VESSEL POSITION Lon.	Depth (m)	LENGTH FGSP - LGSP (km)	Shooting Mode
SJ17IS [SJ17ISmcsP1]	08/07/2017	23:11:19	5200	43_50.80878'N	140_09.42588'E	808	55.6	Distance (25.0m)
	08/07/2017	23:11:19	5200	43_50.80878'N	140_09.42588'E	808		
	09/07/2017	06:27:44	2978	43_32.85288'N	140_42.54720'E	640		
	09/07/2017	06:27:44	2978	43_32.85288'N	140_42.54720'E	640		
SJ17IS [SJ17ISobsP1]	07/07/2017	13:03:38	2303	43_58.92246'N	139_54.28998'E	1158	110.2	Distance (200.0m)
	07/07/2017	13:03:38	2303	43_58.92246'N	139_54.28998'E	1158		
	08/07/2017	02:36:50	1201	43_23.26650'N	140_59.94786'E	64		
	08/07/2017	02:36:50	1201	43_23.26650'N	140_59.94786'E	64		

LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P. / F.G.S.P. / L.G.S.P. / L.S.P.	VESSEL POSITION Lat.	VESSEL POSITION Lon.	Depth (m)	LENGTH FGSP - LGSP (km)	Shooting Mode
SJ17IS [SJ17ISobsrP1]	08/07/2017	03:24:14	1212	43_23.74806'N	140_59.12850'E	70	96.0	Distance (200.0m)
	08/07/2017	03:24:14	1212	43_23.74806'N	140_59.12850'E	70		
	08/07/2017	15:32:22	2172	43_54.82218'N	140_01.97346'E	1048		
	08/07/2017	15:32:22	2172	43_54.82218'N	140_01.97346'E	1048		
SJ1705 [SJ1705mcsP1]	28/06/2017	11:08:03	3639	44_07.84746'N	139_43.97472'E	1181	82.0	Distance (50.0m)
	28/06/2017	11:08:03	3639	44_07.84746'N	139_43.97472'E	1181		
	28/06/2017	22:20:38	2000	44_07.57356'N	140_45.41526'E	461		
	28/06/2017	22:20:38	2000	44_07.57356'N	140_45.41526'E	461		
SJ1705 [SJ1705mcsP2]	05/07/2017	15:59:30	5211	44_06.65124'N	138_45.07632'E	3319	91.6	Distance (50.0m)
	05/07/2017	15:59:30	5211	44_06.65124'N	138_45.07632'E	3319		
	06/07/2017	03:03:41	3380	44_07.46976'N	139_53.68926'E	760		
	06/07/2017	03:03:41	3380	44_07.46976'N	139_53.68926'E	760		
SJ1706 [SJ1706mcsP1]	29/06/2017	01:44:42	1981	43_56.79372'N	140_46.08870'E	539	32.2	Distance (50.0m)
	29/06/2017	01:44:42	1981	43_56.79372'N	140_46.08870'E	539		
	29/06/2017	05:38:32	1337	43_56.78472'N	141_10.15512'E	251		
	29/06/2017	05:38:32	1337	43_56.78472'N	141_10.15512'E	251		
SJ1706 [SJ1706mcsP2]	29/06/2017	08:44:42	1680	43_56.82462'N	140_57.13602'E	425	31.0	Distance (50.0m)
	29/06/2017	08:45:08	1681	43_56.82468'N	140_57.09858'E	426		
	29/06/2017	13:26:50	2300	43_56.84100'N	140_33.96636'E	677		
	29/06/2017	13:26:50	2300	43_56.84100'N	140_33.96636'E	677		
SJ1706 [SJ1706mcsP3]	02/07/2017	19:11:26	5675	43_55.54800'N	138_28.07394'E	3286	174.8	Distance (50.0m)
	02/07/2017	19:11:26	5675	43_55.54800'N	138_28.07394'E	3286		
	03/07/2017	20:08:59	2180	43_56.84370'N	140_38.65200'E	582		
	03/07/2017	20:08:59	2180	43_56.84370'N	140_38.65200'E	582		
SJ1707 [SJ1707mcsP1]	29/06/2017	18:23:23	2000	43_46.04730'N	140_34.22700'E	793	25.9	Distance (50.0m)
	29/06/2017	18:23:23	2000	43_46.04730'N	140_34.22700'E	793		
	29/06/2017	22:36:34	1483	43_46.04094'N	140_53.48964'E	503		
	29/06/2017	22:36:34	1483	43_46.04094'N	140_53.48964'E	503		
SJ1707 [SJ1707mcsP2]	04/07/2017	00:07:16	1880	43_46.05102'N	140_38.42832'E	776	43.3	Distance (50.0m)
	04/07/2017	00:07:16	1880	43_46.05102'N	140_38.42832'E	776		
	04/07/2017	05:32:09	2745	43_45.96288'N	140_06.20040'E	627		
	04/07/2017	05:32:09	2745	43_45.96288'N	140_06.20040'E	627		

LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P. / F.G.S.P. / L.G.S.P. / L.S.P.	VESSEL POSITION Lat.	VESSEL POSITION Lon.	Depth (m)	LENGTH FGSP - LGSP (km)	Shooting Mode
SJ1707 [SJ1707mcsP3]	04/07/2017	12:30:43	2705	43_45.97020'N	140_07.69080'E	532	145.5	Distance (50.0m)
	04/07/2017	12:30:43	2705	43_45.97020'N	140_07.69080'E	532		
	05/07/2017	06:14:04	5614	43_44.58318'N	138_19.34394'E	3499		
	05/07/2017	06:14:04	5614	43_44.58318'N	138_19.34394'E	3499		
SJ1707 [SJ1707OBNP1]	27/06/2017	06:59:51	961	43_45.97872'N	140_41.34144'E	735	21.0	Distance (25.0m)
	27/06/2017	06:59:51	961	43_45.97872'N	140_41.34144'E	735		
	27/06/2017	09:48:43	1801	43_46.14378'N	140_25.68858'E	805		
	27/06/2017	09:48:43	1801	43_46.14378'N	140_25.68858'E	805		
SJ1707 [SJ1707obsP1]	25/06/2017	13:35:35	2155	43_44.58678'N	138_19.43718'E	3492	212.2	Distance (200.0m)
	25/06/2017	13:35:35	2155	43_44.58678'N	138_19.43718'E	3492		
	26/06/2017	22:05:25	1094	43_46.12674'N	140_57.51210'E	449		
	26/06/2017	22:05:25	1094	43_46.12674'N	140_57.51210'E	449		
SJ1708 [SJ1708mcsP1]	01/07/2017	14:53:00	2140	43_35.23812'N	140_25.05414'E	794	156.9	Distance (50.0m)
	01/07/2017	14:53:00	2140	43_35.23812'N	140_25.05414'E	794		
	02/07/2017	11:28:18	5278	43_33.97752'N	138_28.51704'E	3448		
	02/07/2017	11:52:10	5334	43_33.93762'N	138_26.43840'E	3432		

Table 6　List of seismic lines.

(6)　**OBS position list:** Table 7.

Type	Site No.	Lat.	Lon.	Depth	Remarks
T	1	43-44.7058N	138-24.7733E	3504m	Location of deployment
T	2	43-44.7735N	138-29.2546E	3495m	Location of deployment
T	3	43-44.8625N	138-33.7420E	3730m	Location of deployment
T	4	43-44.9507N	138-38.2118E	3479m	Location of deployment
T	5	43-45.0331N	138-42.6852E	3479m	Location of deployment
T	6	43-45.1018N	138-47.1430E	3468m	Location of deployment
T	7	43-45.1636N	138-51.6331E	3437m	Location of deployment
T	8	43-45.2450N	138-56.1248E	3401m	Location of deployment
T	9	43-45.2992N	138-59.8467E	3267m	Location of deployment
T	10	43-45.3444N	139-03.5931E	3034m	Location of deployment
T	11	43-45.4075N	139-07.3322E	2951m	Location of deployment

Type	Site No.	Lat.	Lon.	Depth	Remarks
T	12	43-45.4499N	139-11.0619E	2289m	Location of deployment
T	13	43-45.4969N	139-14.8161E	2440m	Location of deployment
T	14	43-45.5514N	139-18.5655E	3248m	Location of deployment
T	15	43-45.5942N	139-22.2845E	3382m	Location of deployment
T	16	43-45.6386N	139-26.0310E	2477m	Location of deployment
T	17	43-45.6829N	139-29.7582E	2342m	Location of deployment
T	18	43-45.7051N	139-33.5018E	2248m	Location of deployment
T	19	43-45.7391N	139-37.2252E	1983m	Location of deployment
T	20	43-45.7864N	139-40.9813E	2069m	Location of deployment
T	21	43-45.8171N	139-44.7183E	2092m	Location of deployment
T	22	43-45.8286N	139-48.3090E	1476m	Location of deployment
T	23	43-45.8480N	139-52.1595E	973m	Location of deployment
T	24	43-45.9156N	139-55.9045E	1049m	Location of deployment
T	25	43-45.9358N	139-59.6341E	1173m	Location of deployment
T	26	43-45.9648N	140-03.3727E	857m	Location of deployment
T	27	43-45.9601N	140-07.1375E	565m	Location of deployment
T	28	43-45.9568N	140-10.8472E	889m	Location of deployment
T	29	43-45.9932N	140-14.6014E	745m	Location of deployment
T	30	43-46.0136N	140-18.3300E	452m	Location of deployment
T	31	43-46.0308N	140-22.0820E	805m	Location of deployment
T	32	43-46.0368N	140-25.8438E	808m	Location of deployment
T	33	43-45.9845N	140-29.5252E	803m	Location of deployment
N	34				
	SN104	43-46.075N	140-33.516E	800m	Positioning using SSBL
	SN105	43-46.074N	140-33.442E	800m	Positioning using SSBL
	SN106	43-46.078N	140-33.403E	800m	Positioning using SSBL
	SN107	43-46.075N	140-33.343E	800m	Positioning using SSBL
	SN108	43-46.076N	140-33.307E	800m	Positioning using SSBL
	SN109	43-46.08N	140-33.282E	800m	Positioning using SSBL
	SN110	43-46.077N	140-33.247E	800m	Positioning using SSBL
	SN111	43-46.078N	140-33.212E	800m	Positioning using SSBL
	SN112	43-46.079N	140-33.157E	800m	Positioning using SSBL
	SN113	43-46.079N	140-33.089E	800m	Positioning using SSBL

Type	Site No.	Lat.	Lon.	Depth	Remarks
T	35	43-46.0759N	140-36.9719E	780m	Location of deployment
T	36	43-46.0683N	140-40.3367E	751m	Location of deployment
T	37	43-46.0501N	140-43.7254E	684m	Location of deployment
T	36	43-46.0683N	140-40.3367E	751m	Location of deployment
T	37	43-46.0501N	140-43.7254E	684m	Location of deployment
T	38	43-46.0471N	140-47.0994E	602m	Location of deployment
S	39	43-46.0392N	140-50.4619E	534m	Location of deployment
S	40	43-46.0463N	140-53.8281E	504m	Location of deployment
S	41	43-46.0268N	140-57.2006E	458m	Location of deployment
T	101	43-50.8593N	140-09.3123E	812m	Location of deployment
T	102	43-49.2429N	140-12.3135E	756m	Location of deployment
T	103	43-47.6478N	140-15.3097E	664m	Location of deployment
T	105	43-44.4138N	140-21.2895E	715m	Location of deployment
T	106	43-42.7982N	140-24.2865E	806m	Location of deployment
T	107	43-41.1916N	140-27.2703E	804m	Location of deployment
T	108	43-39.5557N	140-30.2306E	796m	Location of deployment
T	109	43-37.9581N	140-33.2369E	785m	Location of deployment
T	110	43-36.3235N	140-36.1915E	765m	Location of deployment
T	111	43-34.6832N	140-39.1905E	711m	Location of deployment
T	112	43-33.0665N	140-42.1697E	658m	Location of deployment
S	113	43-31.4273N	140-45.1223E	567m	Location of deployment
S	114	43-29.8460N	140-48.0133E	498m	Location of deployment
S	115	43-28.1760N	140-51.0543E	325m	Location of deployment
K	116	43-26.6105N	140-53.8831E	102m	Positioning using SSBL
K	117	43-24.9919N	140-56.8495E	80m	Positioning using SSBL
K	118	43-23.3595N	140-59.7998E	66m	Positioning using SSBL
K	119	43-21.7126N	141-02.7643E	55m	Positioning using SSBL
K	120	43-20.1003N	141-05.6761E	43m	Positioning using SSBL

Table 7　List of OBS position. OBSs of the line SJ1707 are from 1 to 40, the line SJ17IS is from 101 to 120.

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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