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R/V *Kaimei* Cruise Report
KM23-13

3D seismic survey to image plate boundary faults in the subduction zone

Nankai Trough

Sep. 27, 2023 - Oct. 29, 2023

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

Contents

1. Cruise Information

● Cruise ID KM23-13

● Name of vessel R/V *Kaimei*

● Title of cruise 3D seismic survey to image plate boundary faults in the subduction zone

● Chief Scientist Leg 1: Ryuta Arai [IMG, JAMSTEC]
Leg 2: Fujio Yamamoto [MarE3, JAMSTEC]
Leg 3: Kazuya Shiraishi [IMG, JAMSTEC]

● Cruise period Leg 1: Sep. 27, 2023 - Oct. 3, 2023
Leg 2: Oct. 3, 2023 - Oct. 8, 2023
Leg 3: Oct. 9, 2023 - Oct. 29, 2003

● Ports of departure / arrival Yokosuka (JAMSTEC) - Yokosuka (JAMSTEC)

● Research area Nankai Trough

● Research map

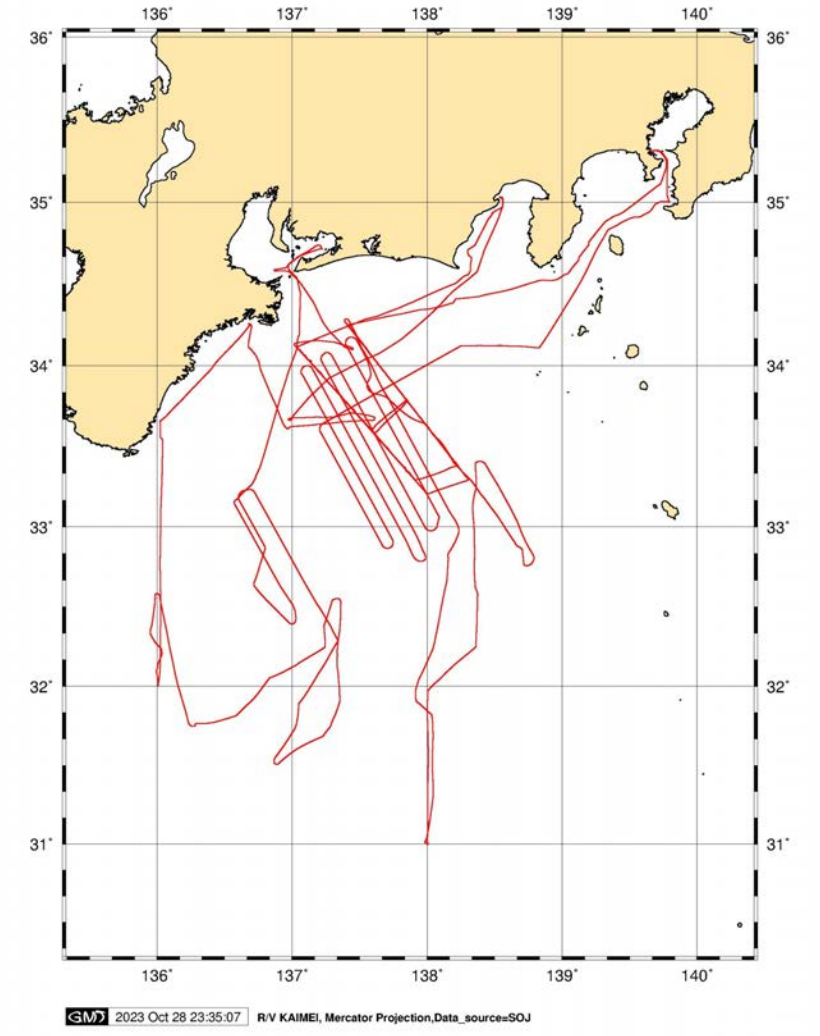

Figure 1: Track chart during the KM23-13 cruise

2. Research Proposal and Science Party

● Title of proposal

Detailed investigation of the offshore seismogenic faults: seismic surveys and observations for crustal deformation

● Representative of Science Party

Leg 1, and Leg 3: Gou Fujie [IMG, JAMSTEC]
Leg 2: Nobu Eguchi [MarE3, JAMSTEC]

● Science Party

Seiichi Miura	IMG, JAMSTEC	Lead proponent, no boarding
Ryuta Arai	IMG, JAMSTEC	Leg 1 chief scientist
Qin Yanfang	IMG, JAMSTEC	Leg 1 vice-chief scientist
Tatsuya Fujinaka	IMG, JAMSTEC/ YNU	Leg 1 onboard scientist
Fujio Yamamoto	MarE3, JAMSTEC	Leg 2 chief scientist
Kazuya Shiraishi	IMG, JAMSTEC	Leg 3 chief scientist
Tetsuo No	IMG, JAMSTEC	Leg 2-3 vice-chief scientist
Paul Flores	IMG, JAMSTEC/ YNU	Leg 2-3 onboard scientist
Tamaki Ishibashi	TUMSAT	Leg 2-3 onboard scientist
Shuichi Kodaira	IMG, JAMSTEC	Proponent, no boarding
Yasushi Ishihara	IMG, JAMSTEC	Proponent, no boarding
Gou Fujie	IMG, JAMSTEC	Proponent, no boarding
Yasuyuki Nakamura	IMG, JAMSTEC	Proponent, no boarding
Yuka Kaiho	IMG, JAMSTEC	Proponent, no boarding
Ayako Nakanishi	IMG, JAMSTEC	Proponent, no boarding
Ryo Miura	IMG, JAMSTEC	Proponent, no boarding
Koichiro Obana	IMG, JAMSTEC	Proponent, no boarding
Tsutomu Takahashi	IMG, JAMSTEC	Proponent, no boarding
Takashi Tonegawa	IMG, JAMSTEC	Proponent, no boarding
Takane Hori	IMG, JAMSTEC	Proponent, no boarding
Takeshi Iinuma	IMG, JAMSTEC	Proponent, no boarding
Yojiro Yamamoto	IMG, JAMSTEC	Proponent, no boarding
Xin Liu	Hong Kong Univ.	Proponent, no boarding
Ryota Hino	Tohoku Univ.	Proponent, no boarding
Motoyuki Kido	Tohoku Univ.	Proponent, no boarding
Yusaku Ohta	Tohoku Univ.	Proponent, no boarding
Tetsuro Tsuru	TUMSAT	Proponent, no boarding
Jin-Oh Park	AORI, Univ. Tokyo	Proponent, no boarding
Masanao Shinohara	ERI, Univ. Tokyo	Proponent, no boarding

● Marine technician team

Yuki Ohwatari	NME	Chief technician
Hikaru Iwamaru	NME	Technician
Keita Suzuki	NME	Technician
Kenya Yamanaka	NME	Technician
Toshikatsu Nasu	NME	Technician
Naoto Noguchi	NME	Technician
Kimiko Serizawa	NME	Technician
Makoto Ito	NME	Technician
Ikumasa Terada	NME	Technician
Takuya Maekawa	NME	Technician
Hidenori Shibata	NME	Technician
Toshinori Saijo	NME	Technician
Hiroyoshi Shimizu	NME	Technician
Tatsuya Sugiyama	NME	Technician
Yuta Suzuki	NME	Technician

3. Research/Development Activities

Background and objectives

The cruise KM23-13 aims at revealing three-dimensional geometry and physical properties of faults in the Nankai Trough region as described in the mid-term to long-term research plan of JAMSTEC. The survey area ranging from the Kumano-nada to Enshu-nada is known to have generated the Showa Tonankai earthquake in 1944 and host slow earthquakes including tremor and very low frequency earthquakes on the updip area of the seismogenic zone. In 2004, earthquakes with a magnitude of 7 occurred inside the subducting Philippine Sea plate. To reveal structural controls on the variety of slip behaviors, we conducted the multi-channel seismic reflection survey and the refraction and wide-angle reflection survey using ocean-bottom seismographs.

Leg 1

For refraction and wide-angle reflection survey, we deployed a total of 100 ocean bottom seismographs on two across-trough profiles. In addition, 1 newly-developed rechargeable ocean bottom seismograph was deployed as a field test. These 101 ocean bottom seismographs will record air-gun signals from seismic refraction and reflection surveys which will be done during Leg 2 and Leg 3.

Leg 2

To make preparation of the multi-channel seismic survey system with a total of 6 km hydrophone streamer, we checked the condition of repaired cables and connected them with other maintained cables. When any errors were identified, we removed or fixed the problematic cables and modules.

Leg 3

To obtain high-resolution seismic reflection profiles of subsurface geological structures down to the top of the oceanic crust, we conducted the multi-channel seismic reflection survey using a large volume airgun array and a long hydrophone streamer cable. Also, we conducted airgun shooting, which was recorded by the ocean-bottom seismographs deployed in Leg 1, for refraction and wide-angle reflection survey.

Activities, observations

(1) Deployment of ocean-bottom seismographs

We deployed 101 ocean-bottom seismographs (OBSs) along two lines, 51 sites on OBSNT07 (sites 1 - 50, and 40R) and 50 sites on OBSNT08 (sites 51 - 100) (Figure 2, Table 1). In addition to 98 standard type OBSs, we deployed two ultra-deep type and one rechargeable type for some field tests (Table 1). The deployed OBSs recorded seismic signals from airgun shots in Leg 3, and will be recovered in another cruise by using a chartered vessel in the early 2024.

(2) Condition check and maintenance of streamer cables

We checked the condition of hydrophone streamer cables, which should have been repaired at the production factory, to use the primary MCS system on R/V *Kaimei* with a total of 6-km streamer in Leg 3. However, we only checked a total of 4.5 km length of connected cables because of some technical problems in Leg 2.

Because we were not able to continue the MCS data acquisition with the primary system in Leg 3 due to a lot of issues on the cables, we finally changed to the other MCS system with a total of 5.5-km streamer cable that was moved from R/V *Kairei* as a backup system (Table 2).

(3) Multi-channels seismic reflection survey

To acquire multi-channel seismic data, a single 4.5 km or 5.5-km streamer cable was towed at 25 m in depth, and an air gun array formed by four strings of air gun clusters (10,600 $inch^3$ volume in total) was towed at 10 m and fired at every 50 m along survey lines (Table 2, Figure 2). The acquired data were quickly processed onboard for data quality control and preliminary investigation of geological structures.

(4) Airgun shooting for refraction and wide-angle seismic survey

To acquire refraction and wide-angle reflection seismic data, an air gun array formed by four strings of air gun clusters (10,600 $inch^3$ volume in total) was towed at 10 m depth and fired every 200 m along the survey lines OBSNT07 and OBSNT08 where ocean-bottom seismograms (OBSs) were deployed during Leg 1 (Figure 2, Tables 2, 3).

(5) XCTD (expendable conductivity, temperature, and depth profile)
To obtain accurate velocity profile in the water column, XCTD casts were conducted at three points during the cruise, which were possible only when airgun subarrays were not towed (Figure 2).

(6) Bathymetry, magnetometry, and gravimetry
The bathymetry and three-component magnetic field and shipboard gravity data were continuously recorded during the cruise. The bathymetry observed along the seismic survey lines is shown in Figure 3.

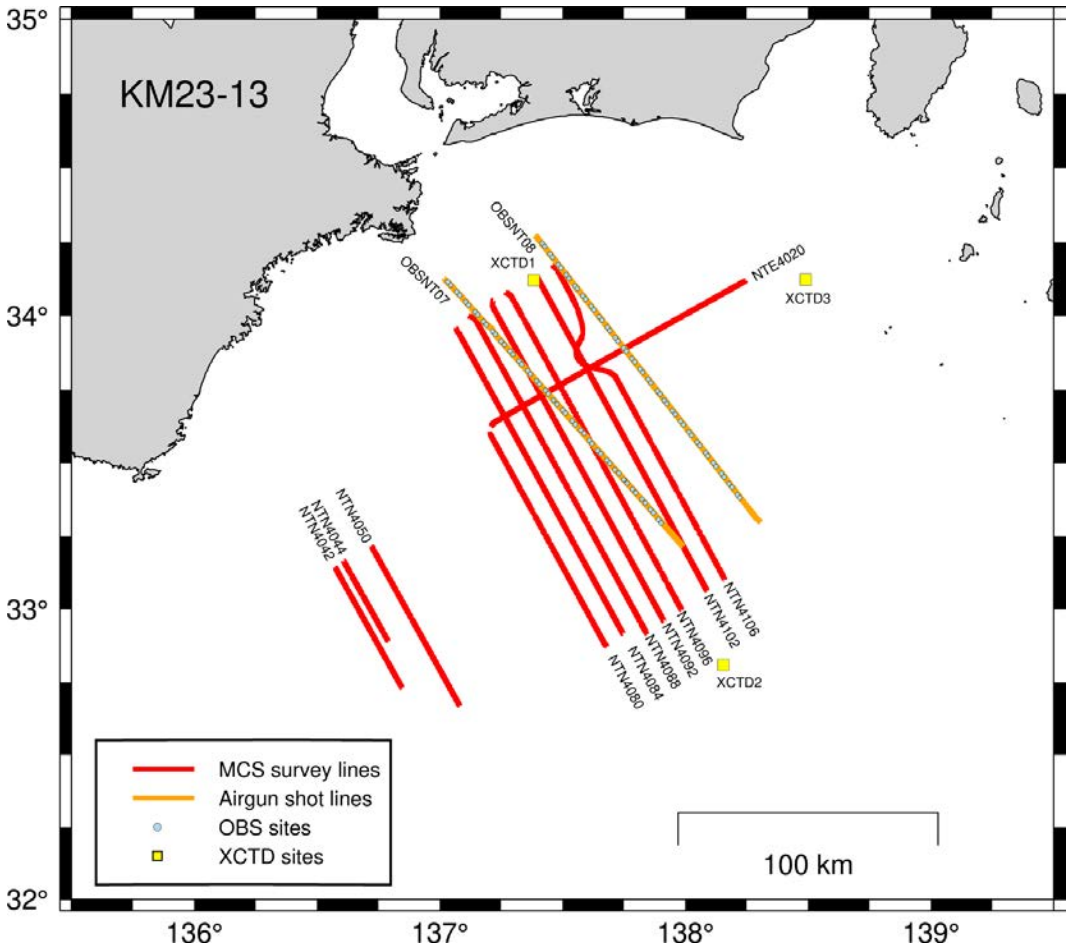

Figure 2: KM23-13 observation summary map.

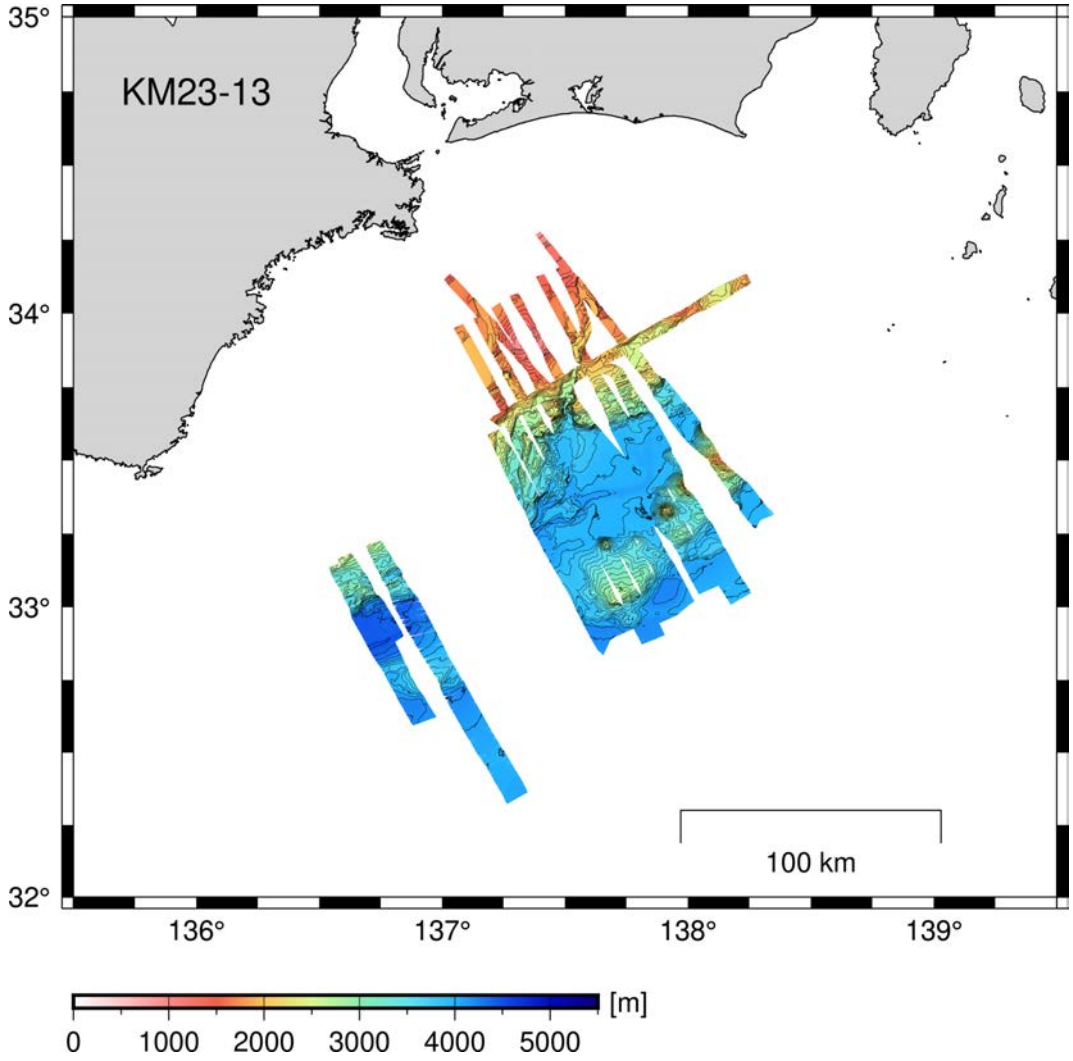

Figure 3: Bathymetry map observed along the seismic survey lines.

Table 1: Location list of ocean-bottom seismographs (OBSs). Three different types of OBSs (K: standard Katsushima type, RK: rechargeable Katsushima type, and 9K: Ultra deep Katsushima type) were deployed at 101 locations (Sites 1 - 50 and 41R along OBSNT07, and Site 51-100 along OBSNT08).

Site	Latitude (dd, mm.mmmm)			Longitude (dd, mm.mmmm)			Depth (m)	Type
1	34	6.8843	N	137	1.9783	E	1492.4	K
2	34	6.2267	N	137	2.7062	E	1687.3	K
3	34	4.8432	N	137	4.1471	E	1698.7	K
4	34	4.1978	N	137	4.8823	E	1692.1	K
5	34	2.8616	N	137	6.3306	E	1614.8	K
6	34	2.1963	N	137	7.0440	E	1634.7	K
7	34	0.8077	N	137	8.6517	E	1845.3	K
8	34	0.1777	N	137	9.2712	E	1843.8	K
9	33	58.8421	N	137	10.6660	E	1873.1	K
10	33	58.1657	N	137	11.3678	E	1893.9	K
11	33	56.8416	N	137	12.8724	E	1788.7	K
12	33	56.1981	N	137	13.6098	E	1733.6	K
13	33	54.8140	N	137	14.9703	E	1472.8	K
14	33	54.1207	N	137	15.7774	E	1292.2	K
15	33	52.8116	N	137	17.1903	E	1126.1	K
16	33	52.1327	N	137	17.8948	E	1254.2	K
17	33	50.7893	N	137	19.3557	E	1322.1	K
18	33	50.1256	N	137	20.0324	E	1290.9	K
19	33	48.8010	N	137	21.4553	E	1375.7	K
20	33	48.1203	N	137	22.1782	E	1475.1	K
21	33	46.7577	N	137	23.6528	E	1555.5	K
22	33	46.1043	N	137	24.3605	E	1741.7	K
23	33	44.8183	N	137	25.8018	E	1881.6	K
24	33	44.0773	N	137	26.5235	E	2167.6	K
25	33	42.8220	N	137	27.7945	E	2572.4	K
26	33	41.9897	N	137	28.6664	E	2410.4	K
27	33	40.7961	N	137	30.0206	E	3172.8	K
28	33	40.1556	N	137	30.7077	E	3164.8	K
29	33	38.5831	N	137	32.3558	E	3162.5	K
30	33	37.8582	N	137	33.0918	E	2782.5	K
31	33	36.7000	N	137	34.4578	E	3501.4	K
32	33	36.0405	N	137	35.2599	E	3803.0	K
33	33	34.5969	N	137	36.5675	E	3898.9	K
34	33	33.9324	N	137	37.1917	E	3939.5	K
35	33	32.5093	N	137	38.5506	E	3964.4	K
36	33	31.8879	N	137	39.3525	E	4007.0	K
37	33	30.5775	N	137	40.8338	E	4023.4	K
38	33	29.9216	N	137	41.5283	E	4065.6	K
39	33	28.5999	N	137	42.7626	E	4035.7	9K
40	33	27.8814	N	137	43.7748	E	4011.5	9K
41	33	26.5276	N	137	45.1392	E	4016.6	K
41R	33	26.5870	N	137	44.9426	E	4036.4	RK
42	33	25.8287	N	137	45.8167	E	4030.0	K
43	33	24.6456	N	137	47.1018	E	4101.6	K
44	33	23.8559	N	137	47.8907	E	4116.2	K
45	33	22.5916	N	137	49.4051	E	4014.5	K
46	33	21.7991	N	137	50.2262	E	4027.9	K
47	33	20.4502	N	137	51.5096	E	3880.7	K
48	33	19.8090	N	137	52.2180	E	3579.5	K
49	33	18.4162	N	137	53.4221	E	3324.6	K
50	33	17.6977	N	137	54.1078	E	3478.2	K
51	34	14.7273	N	137	24.9950	E	1021.7	K
52	34	14.0320	N	137	25.6479	E	1028.9	K
53	34	12.5338	N	137	26.9559	E	1262.7	K

54	34	11.8787	N	137	27.5669	E	1266.2	K
55	34	10.4188	N	137	28.9281	E	1321.0	K
56	34	9.7320	N	137	29.5990	E	1339.0	K
57	34	8.3204	N	137	30.9123	E	1310.4	K
58	34	7.6000	N	137	31.5904	E	1329.0	K
59	34	6.0368	N	137	33.0445	E	1819.6	K
60	34	5.5059	N	137	33.5892	E	1823.4	K
61	34	4.0737	N	137	34.9179	E	1868.1	K
62	34	3.3706	N	137	35.6311	E	1842.8	K
63	34	1.9414	N	137	37.0010	E	1943.4	K
64	34	1.2197	N	137	37.6394	E	1947.6	K
65	33	59.8109	N	137	38.9260	E	1528.9	K
66	33	59.1064	N	137	39.6243	E	1602.2	K
67	33	57.6889	N	137	40.9566	E	1780.3	K
68	33	56.9729	N	137	41.5839	E	1770.5	K
69	33	55.5557	N	137	42.9076	E	1673.1	K
70	33	54.8402	N	137	43.5484	E	1789.6	K
71	33	53.4580	N	137	44.9417	E	2473.3	K
72	33	52.7508	N	137	45.5888	E	2495.2	K
73	33	51.3029	N	137	46.9309	E	2596.5	K
74	33	50.5905	N	137	47.6337	E	2580.9	K
75	33	49.1887	N	137	48.9626	E	2460.3	K
76	33	48.4697	N	137	49.6079	E	2360.8	K
77	33	47.0725	N	137	50.9040	E	2251.5	K
78	33	46.3458	N	137	51.5852	E	2382.5	K
79	33	44.6708	N	137	53.1773	E	3178.4	K
80	33	44.0620	N	137	53.8206	E	3570.2	K
81	33	42.7902	N	137	54.8515	E	3486.6	K
82	33	42.0774	N	137	55.5003	E	3530.8	K
83	33	40.6676	N	137	56.8249	E	3722.0	K
84	33	39.9428	N	137	57.5640	E	3955.5	K
85	33	38.5268	N	137	58.8269	E	4059.2	K
86	33	37.8262	N	137	59.5691	E	3995.6	K
87	33	36.3246	N	138	0.8306	E	3956.6	K
88	33	35.6422	N	138	1.5092	E	3851.8	K
89	33	34.2464	N	138	2.8831	E	3384.0	K
90	33	33.5450	N	138	3.5576	E	3274.7	K
91	33	32.0836	N	138	4.9934	E	2678.1	K
92	33	31.4334	N	138	5.4849	E	2466.4	K
93	33	29.9974	N	138	6.8654	E	1791.5	K
94	33	29.2856	N	138	7.5066	E	1934.4	K
95	33	27.8465	N	138	8.8414	E	2422.4	K
96	33	27.1076	N	138	9.4682	E	2653.1	K
97	33	25.7553	N	138	10.6601	E	3038.1	K
98	33	25.0185	N	138	11.4265	E	3034.3	K
99	33	23.5001	N	138	12.7410	E	3943.2	K
100	33	22.8352	N	138	13.2996	E	4031.9	K

Table 2: Basic specifications of KM23-13 seismic survey

Source		
Total airgun volume	10,600 in^3 (173.7 litters)	
Towing depth	10 m	
Shot interval	50 m (MCS reflection survey) 200 m (OBS refraction survey)	
Control system	GunLink 2500	
Receiver		
(1) SEAMAP NTRS2		NTN4042, NTN4044, NTN4050
Cable length	4.5 km	
Number of channels	1440 channels	
Group interval	3.125 m	
(2) Sercel SEAL		NTE4020, NTN4080, NTN4084, NTN4088, NTN4092, NTN4096, NTN4102, NTN4106
Cable length	5.5 km	
Number of channels	444 channels	
Group interval	12.5 m	
Towing depth (common)	25 m	
Recording		
Record length	14 s	
Sampling rate	2 ms	
Data format	SEG-D 8058 Rev.1	
Navigation		
Navigation system	ORCA system	
Positioning	Differential Global Positioning System	

Table 3: List of Seismic survey lines. F.S.P./L.S.P.: first or last shot point, F.G.S.P/L.G.S.P: first or last good shot point.

Line name	Date (UTC)	Time (UTC)	F.S.P. F.G.S.P. L.G.S.P. L.S.P.	Vessel position Latitude (deg_mm.mm)	 Longitude (deg_mm.mm)	Length (FGSP - LGSP) (km)	Direction (°)
NTE4020	2023/10/27	04:57:00	1551	33_37.87986'N	137_12.85098'E	109.8	59.1
	2023/10/27	04:57:00	1551	33_37.87986'N	137_12.85098'E		
	2023/10/27	20:35:32	3746	34_07.11996'N	138_14.76222'E		
	2023/10/27	20:35:32	3746	34_07.11996'N	138_14.76222'E		
NTN4042	2023/10/11	22:53:10	1270	32_43.96422'N	136_50.67390'E	52.3	330.0
	2023/10/11	22:53:10	1270	32_43.96422'N	136_50.67390'E		
	2023/10/12	04:39:38	2315	33_08.66712'N	136_34.37160'E		
	2023/10/12	04:39:38	2315	33_08.66712'N	136_34.37160'E		
NTN4044	2023/10/11	03:50:41	2331	33_09.58656'N	136_36.69504'E	33.6	150.0
	2023/10/11	03:55:23	2319	33_09.30534'N	136_36.88806'E		
	2023/10/11	08:01:01	1647	32_53.41662'N	136_47.37414'E		
	2023/10/11	08:14:45	1611	32_52.56600'N	136_47.93640'E		
NTN4050	2023/10/10	17:46:48	1001	32_40.37880'N	137_04.67592'E	68.8	330.0
	2023/10/10	17:46:48	1001	32_40.37880'N	137_04.67592'E		
	2023/10/11	01:42:21	2377	33_12.94428'N	136_43.29570'E		
	2023/10/11	01:42:21	2377	33_12.94428'N	136_43.29570'E		
NTN4080	2023/10/26	19:14:13	1071	32_52.57014'N	137_40.50372'E	92.3	330.0

	2023/10/26	19:14:13	1071	32_52.57014'N	137_40.50372'E		
	2023/10/27	04:36:45	2916	33_36.43536'N	137_12.20970'E		
	2023/10/27	04:36:45	2916	33_36.43536'N	137_12.20970'E		
NTN4084	2023/10/26	01:21:04	3730	33_57.20592'N	137_04.05846'E	131.2	150.0
	2023/10/26	01:21:04	3730	33_57.20592'N	137_04.05846'E		
	2023/10/26	17:49:54	1106	32_54.98232'N	137_44.74194'E		
	2023/10/26	17:49:54	1106	32_54.98232'N	137_44.74194'E		
NTN4088	2023/10/25	10:18:48	1001	32_55.13850'N	137_50.46462'E	137.4	330.0
	2023/10/25	10:18:48	1001	32_55.13850'N	137_50.46462'E		
	2023/10/26	00:27:13	3748	33_59.91648'N	137_07.07724'E		
	2023/10/26	00:27:13	3748	33_59.91648'N	137_07.07724'E		
NTN4092	2023/10/24	07:08:53	3740	34_02.75022'N	137_12.90444'E	137.0	150.0
	2023/10/24	07:08:53	3740	34_02.75022'N	137_12.90444'E		
	2023/10/25	01:29:40	1001	32_57.51270'N	137_54.75888'E		
	2023/10/25	01:29:40	1001	32_57.51270'N	137_54.75888'E		
NTN4096	2023/10/23	16:45:39	1001	33_00.18594'N	137_58.88898'E	130.2	330.0
	2023/10/23	17:22:24	1127	33_03.17520'N	137_56.94948'E		
	2023/10/24	06:20:27	3730	34_04.70280'N	137_16.11690'E		
	2023/10/24	06:20:27	3730	34_04.70280'N	137_16.11690'E		
NTN4102	2023/10/22	18:37:35	3675	34_07.35456'N	137_24.10488'E	131.0	150.0
	2023/10/22	18:57:07	3620	34_06.04812'N	137_24.95898'E		
	2023/10/23	14:02:04	1001	33_03.80292'N	138_05.29062'E		
	2023/10/23	14:02:04	1001	33_03.80292'N	138_05.29062'E		
NTN4106	2023/10/22	02:38:57	1001	33_06.47814'N	138_09.40410'E	134.5	330.0
	2023/10/22	02:38:57	1001	33_06.47814'N	138_09.40410'E		
	2023/10/22	17:18:21	3690	34_10.22436'N	137_27.61530'E		
	2023/10/22	17:18:21	3690	34_10.22436'N	137_27.61530'E		
OBSNT07	2023/10/15	08:44:43	3701	34_07.41912'N	137_01.21782'E	135.0	137.0
	2023/10/15	08:44:43	3701	34_07.41912'N	137_01.21782'E		
	2023/10/16	02:22:09	1001	33_12.93426'N	137_59.37564'E		
	2023/10/16	02:22:09	1001	33_12.93426'N	137_59.37564'E		
OBSNT08	2023/10/16	06:02:15	1001	33_18.09306'N	138_18.15378'E	136.8	320.4
	2023/10/16	06:02:15	1001	33_18.09306'N	138_18.15378'E		
	2023/10/16	21:15:05	3737	34_16.27938'N	137_23.39508'E		
	2023/10/16	21:15:05	3737	34_16.27938'N	137_23.39508'E		

4. Cruise Log

	Date		Remarks
Leg 1	Sep. 27	Wed	Departure from JAMSTEC Yokosuka port
	Sep. 28	Thu	OBS deployment
	Sep. 29	Fri	OBS deployment
	Sep. 30	Sat	OBS deployment
	Oct. 1	Sun	OBS deployment
	Oct. 2	Mon	Survey equipment change
Leg 2	Oct. 3	Tue	Embarkation/Disembarkation off Shimizu port with a ferry boat
	Oct. 4	Wed	Cable deployment and set up
	Oct. 5	Thu	Cable retrieval, wait on weather off Ago bay
	Oct. 6	Fri	Wait on weather off Shingu
	Oct. 7	Sat	Cable deployment and set up
	Oct. 8	Sun	Cable set up, paravane and airgun deployment, test shot
Leg 3	Oct. 9	Mon	Airgun retrieval, cable fixing
	Oct. 10	Tue	Cable fixing, Airgun deployment, test shot
	Oct. 11	Wed	NTN4050 (02:42-10:42), NTN4044 (12:46-17:02), Cable fixing (shark bite)
	Oct. 12	Thu	Cable fixing, NTN4042 (07:52-13:39), all equipment retrieval
	Oct. 13	Fri	Wait on weather in Mikawa bay, equipment maintenance
	Oct. 14	Sat	Wait on weather in Mikawa bay, equipment maintenance
	Oct. 15	Sun	XCTD, Airgun deployment, test shot, OBSNT07 (17:43 - cont.)
	Oct. 16	Mon	OBSNT07 (cont. - 11:22), OBSNT08 (15:00 - cont.)
	Oct. 17	Tue	OBSNT08 (cont. - 06:15), Airgun No.2&3 retrieval, MCS set up and cable fixing
	Oct. 18	Wed	Cable fixing
	Oct. 19	Thu	Cable fixing, Airgun No.1&4 retrieval, Paravane retrieval
	Oct. 20	Fri	Cable fixing, cable retrieval, maintenance, preparation for cable change
	Oct. 21	Sat	Cable deployment, Paravane and Airgun deployment, test shot
	Oct. 22	Sun	XCTD, Airgun reset, Test shot, NTN4106 (11:35 - cont.)
	Oct. 23	Mon	NTN4106 (cont. - 02:18), NTN4102 (3:33 - 23:02),
	Oct. 24	Tue	NTN4096 (01:42 - 15:20), NTN4092 (16:03 - cont.),
	Oct. 25	Wed	NTN4092 (cont. - 10:29), airgun maintenance, NTN4088 (19:15 - cont.)
	Oct. 26	Thu	NTN4088 (cont. - 09:27), NTN4084 (10:16 - cont.),
	Oct. 27	Fri	NTN4084 (cont. - 02:50), NTN4080 (3:30 - 13:36), NTE4020 (13:52 - cont.),
	Oct. 28	Sat	NTE4020 (cont. - 5:35), All equipment retrieval, XCTD
	Oct. 29	Sun	Arrival at JAMSTEC Yokosuka port

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.
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