



R/V *Kaimei* “Cruise Report”
KM23-07



Active source seismic survey and geodetic observations
in the Japan and Kuril Trenches

Japan and Kuril Trench

May 29,2023-Jun.17,2023

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

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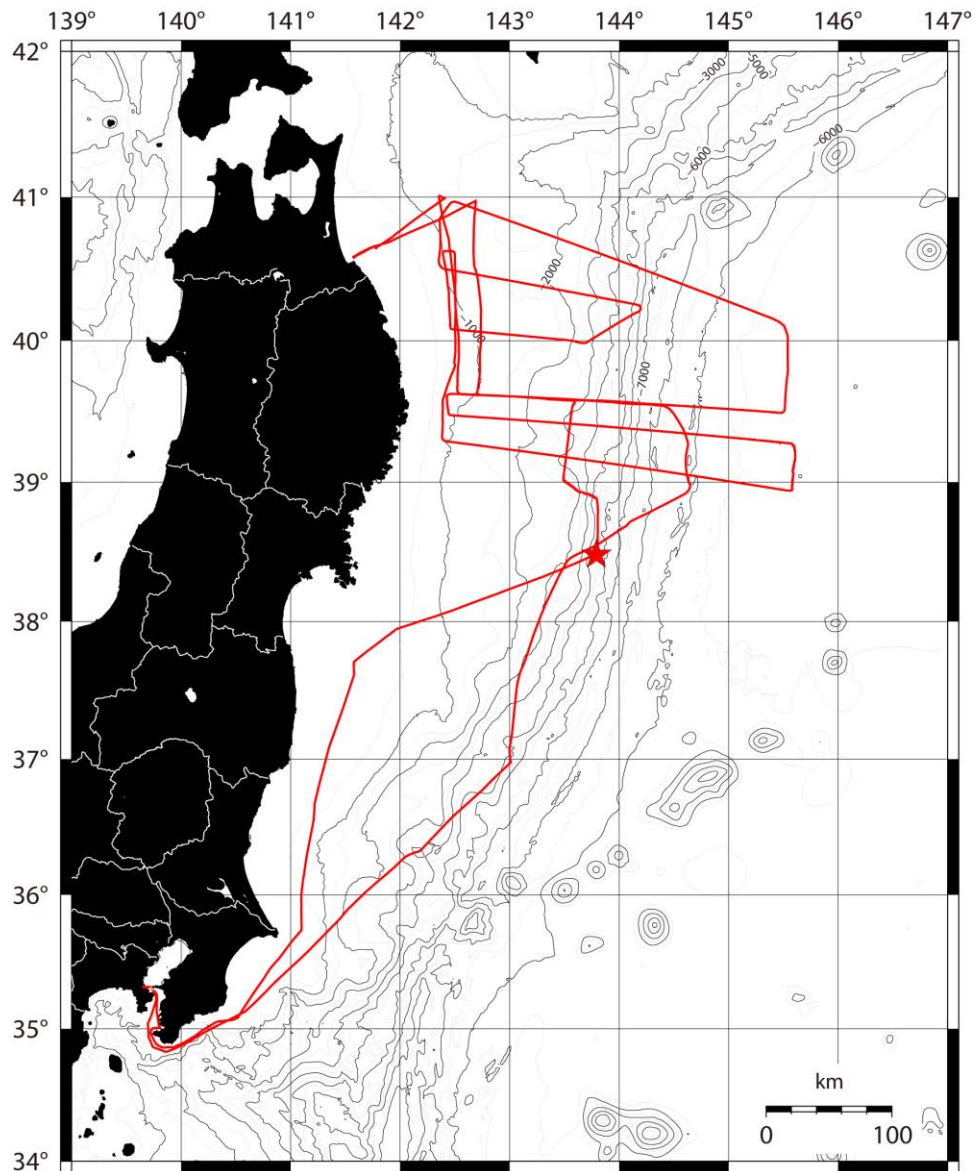
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1. Cruise Information

- Cruise ID: KM23-07
- Name of vessel: R/V Kaimei
- Title of cruise: Active source seismic survey and geodetic observations in the Japan and Kuril Trenches
- Chief Scientist [Affiliation]:
 - Leg.1 Fujio Yamamoto [JAMSTEC]
 - Leg.2 Yasuyuki Nakamura [JAMSTEC]
- Cruise period:
 - Leg.1 29 May 2023 – 1 June 2023
 - Leg.2 2 June 2023 – 17 June 2023
- Ports of departure / arrival: Yokosuka - Yokosuka
- Research area: Japan and Kuril Trench
- Research map



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 [Affiliation]: Seiichi Miura [JAMSTEC]
- Science Party (List) [Affiliation, assignment etc.]
 - Seiichi Miura [JAMSTEC]
 - Kazuya Shiraishi [JAMSTEC]
 - Tetsuo No [JAMSTEC]
 - Yasushi Ishihara [JAMSTEC]
 - Gou Fujie [JAMSTEC]
 - Yasuyuki Nakamura [JAMSTEC]
 - Yuka Kaiho [JAMSTEC]
 - Ayako Nakanishi [JAMSTEC]
 - Ryuta Arai [JAMSTEC]
 - Yanfang Qin [JAMSTEC]
 - Ryo Miura [JAMSTEC]
 - Koichiro Obana [JAMSTEC]
 - Tsutomu Takahashi [JAMSTEC]
 - Takashi Tonegawa [JAMSTEC]
 - Takane Hori [JAMSTEC]
 - Takeshi Iinuma [JAMSTEC]
 - Yojiro Yamamoto [JAMSTEC]
 - Ryota Hino [Tohoku Univ.]
 - Motoyuki Kido [Tohoku Univ.]
 - Yusaku Ohta [Tohoku Univ.]
 - Shuichi Kodaira [JAMSTEC]
 - Tetsuro Tsuru [Tokyo Univ. Marine Science and Technology]
 - Jin-Oh Park [Univ. Tokyo]
 - Fujio Yamamoto [JAMSTEC]
 - Rodolfo Lopez Alvarez [Seamap]
- Onboard Science Party (List) [Affiliation, assignment etc.]
 - Fujio Yamamoto [JAMSTEC]: Chief Scientist (Leg 1)
 - Yasuyuki Nakamura [JAMSTEC]: Chief Scientist (Leg 2), Associate Chief Scientist (Leg 1)
 - Tetsuo No [JAMSTEC]: Associate Chief Scientist (Leg 2)
 - Rodolfo Lopez Alvarez [Seamap]
 - Yuuki Owatari [NME] Chief Marine Technician
 - Hikaru Iwamaru [NME]: Marine Technician, Chief Observer
 - Keita Suzuki [NME]: Marine Technician, Chief Navigator
 - Misaki Horiuchi [NME]: Marine Technician, Chief QC/Processor
 - Haruki Doi [NME]: Marine Technician, Chief Gunner
 - Yoshiki Horiuchi [NME]: Marine Technician, Observer
 - Ken'ya Yamanaka [NME]: Marine Technician, Navigator
 - Toshimasa Nasu [NME]: Marine Technician, Gunner
 - Naoto Noguchi [NME]: Marine Technician, QC/Processor
 - Hidenori Shibata [NME]: Marine Technician, Gunner
 - Ikumasa Terada [NME]: Marine Technician, Navigator
 - Kimiko Serizawa [NME]: Marine Technician, QC/Processor
 - Takehiro Higashi [NME]: Marine Technician, Observer
 - Yuta Suzuki [NME]: Marine Technician, Gunner

3. Research/Development Activities

3.1 Background and objectives

This survey was planned to conduct the seismic reflection survey and the GNSS-A geodetic observations in the Japan and Kuril Trenches to achieve the mid-term goal "Understanding the seismogenic zone by offshore surveys and observations." We conducted a multi-channel seismic survey to delineate the subsurface structure around the Japan Trench from oceanward outer rise area to the megathrust in the subduction zone. The GNSS-A observation was conducted to measure the crustal movement in the Japan trench during this cruise. The air guns were shot during some portions of the transit between the seismic survey lines, and the air gun signals were recorded by onshore/offshore seismometers to reveal the seismological structure in the Japan Trench forearc region. At the beginning of the cruise, maintenance works of *Kaimei* streamer cable were also conducted to check the cable condition and remove bad sections and modules.

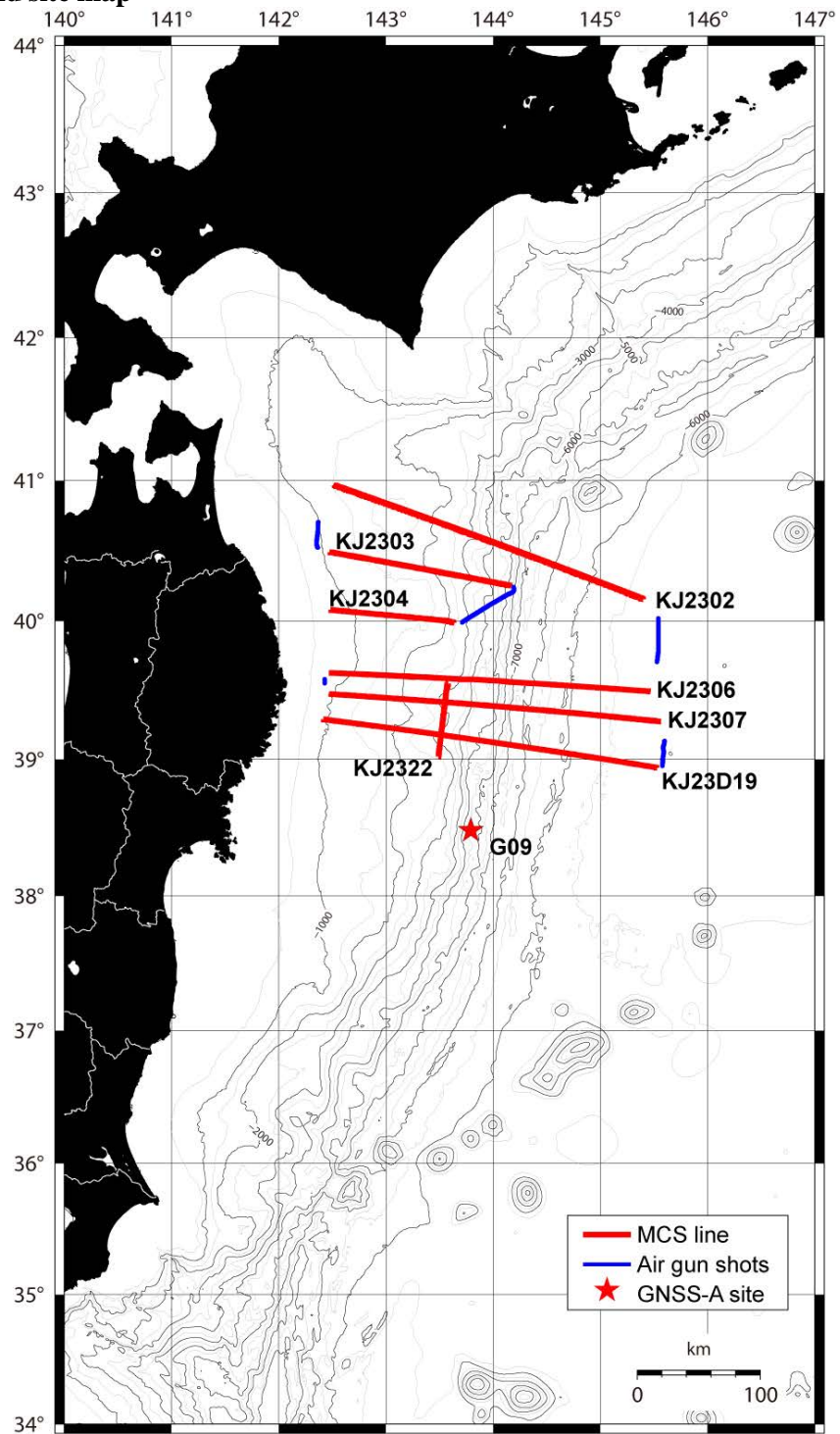
3.2 List of observations

- (1) Maintenance and condition check of the *Kaimei* streamer cable
In total 7125 m-long streamer cable was prepared at the beginning of the cruise. After the maintenance and condition check, 6075 m-long cable was confirmed to be available for data acquisition.
- (2) 2D reflection seismic survey (MCS)
R/V *Kaimei* towed a streamer cable (6075 m long) at 12-25 m depth, and the air gun arrays (10600 inch³ in total) at 10 m depth along the survey lines. Air guns were fired every 50 or 75 m depending on the sea current situation.
- (3) Air gun shooting
Air guns were also fired during the transit between MCS survey lines. Onshore/offshore seismographs recorded the air gun signals. The air guns were fired every 45 s.
- (4) GNSS-A observation
We conducted GNSS-Acoustic (GNSS-A) positioning observations at a submarine crustal deformation observation site G09 in the Japan Trench using a crustal deformation sensor (ship's bottom transducer) and a GPS antenna mounted on the R/V *Kaimei*. The observation started near the center of the sensor array of the site, and then moving observations (approximately 4.0 knots) were performed on the circumference of a diameter equal to the water depth at the site. One XCTD observation was performed before the GNSS-A observation.
- (5) XCTD
Three XTD casts were conducted during the cruise to obtain accurate velocity profiles in the water column.
- (6) Bathymetry and magnetic measurements
Bathymetry and magnetometer data were recorded during the cruise.

3.3 List of equipment used during the cruise

- 2D MCS system
- XCTD-4
- Multibeam echo sounder EM122
- Three-component magnetometer SFG-2015
- Gravimeter MGS-6

3.4 Line and site map



3.5 Seismic line list

MCS survey lines

NO.	LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P.	VESSEL POSITION		NUMBER OF SHOT FGSP - LGSP (SP# Increment)	LENGTH FGSP - LGSP (km)	DIRECT ION (°)	Mode (m)
				F.G.S.P.						
				L.G.S.P.						
				L.S.P.						
1	KJ2302-1004	2023/06/06	01:33:14	6214	40_09.35958'N	145_23.82624'E	5214	260.7	288.3	Distance (50m)
		2023/06/06	01:33:14	6214	40_09.35958'N	145_23.82624'E				
		2023/06/07	06:00:09	1001	40_58.01322'N	142_30.52242'E	-1			
		2023/06/07	06:00:09	1001	40_58.01322'N	142_30.52242'E				
2	KJ2303-1005	2023/06/07	14:12:00	1001	40_29.48340'N	142_28.60614'E	2924	146.2	99.0	Distance (50m)
		2023/06/07	14:12:00	1001	40_29.48340'N	142_28.60614'E				
		2023/06/08	07:31:21	3924	40_15.06048'N	144_10.12152'E	1			
		2023/06/08	07:31:21	3924	40_15.06048'N	144_10.12152'E				
3	KJ2304-1006	2023/06/08	14:55:59	3100	39_59.18448'N	143_38.19402'E	1983	99.1	277.9	Distance (50m)
		2023/06/08	14:55:59	3100	39_59.18448'N	143_38.19402'E				
		2023/06/09	02:04:39	1118	40_04.73844'N	142_28.90236'E	-1			
		2023/06/09	02:04:39	1118	40_04.73844'N	142_28.90236'E				
4	KJ2306-1001	2023/06/01	04:26:49	2470	39_35.73558'N	143_16.05756'E	845	42.2	271.4	Distance (50m)
		2023/06/01	04:26:49	2470	39_35.73558'N	143_16.05756'E				
		2023/06/01	09:34:41	1626	39_36.99030'N	142_46.61922'E	-1			
		2023/06/01	09:50:45	1586	39_37.03758'N	142_45.22272'E				
5	KJ2306-2002	2023/06/04	18:14:17	1650	39_36.94506'N	142_47.77470'E	918	45.9	91.4	Distance (50m)
		2023/06/04	18:14:56	1652	39_36.94386'N	142_47.84448'E				
		2023/06/04	23:00:10	2569	39_35.75754'N	143_19.83984'E	1			
		2023/06/04	23:00:10	2569	39_35.75754'N	143_19.83984'E				
6	KJ2306-3003	-	-	2254	-	-	2439	182.9	91.4	Distance
		2023/06/04	23:07:32	2064	39_35.72256'N	143_20.76432'E				

		2023/06/05	16:00:28	4502	39_29.52180'N	145_28.14540'E				(75m)
		2023/06/05	16:00:28	4502	39_29.52180'N	145_28.14540'E	1			
7	KJ2306-4009	2023/06/14	00:32:15	1061	39_37.55826'N	142_28.25988'E	1206	60.3	91.4	Distance (50m)
		2023/06/14	00:54:01	1106	39_37.51608'N	142_30.61818'E				
		2023/06/14	10:27:32	2311	39_35.20170'N	143_33.68616'E	1			
		2023/06/14	10:27:32	2311	39_35.20170'N	143_33.68616'E				
8	KJ2307-1008	2023/06/12	02:36:33	6416	39_16.53996'N	145_33.80886'E	5333	266.6	272.8	Distance (50m)
		2023/06/12	02:52:34	6393	39_16.59498'N	145_33.01224'E				
		2023/06/13	21:50:05	1061	39_28.47540'N	142_27.99486'E	-1			
		2023/06/13	21:50:05	1061	39_28.47540'N	142_27.99486'E				
9	KJ2322-1010	2023/06/14	11:30:58	4620	39_32.82714'N	143_34.78194'E	1150	57.5	185.3	Distance (50m)
		2023/06/14	11:48:58	4653	39_31.97328'N	143_34.31226'E				
		2023/06/14	23:00:07	5802	39_01.16436'N	143_29.35890'E	1			
		2023/06/14	23:00:07	5802	39_01.16436'N	143_29.35890'E				
10	KJ23D19-1007	2023/06/10	04:38:30	1001	39_17.40798'N	142_25.15578'E	3584	268.7	96.3	Distance (75m)
		2023/06/10	04:59:04	1041	39_17.21196'N	142_27.22668'E				
		2023/06/11	09:12:32	4624	38_56.43114'N	145_31.74378'E	1			
		2023/06/11	09:12:32	4624	38_56.43114'N	145_31.74378'E				
Total							25598	1429.8		

Air gun shots

NO.	LINE NAME	DATE (UTC)	TIME (UTC)	F.S.P.	VESSEL POSITION		NUMBER OF SHOT FGSP - LGSP (SP# Increment)	LENGTH FGSP - LGSP (km)	DIRECTION (°)	Mode
				F.G.S.P.						
				L.G.S.P.						
				L.S.P.						
1	TEST-9005	2023/06/01	09:53:18	1001	39_37.04292'N	142_44.99094'E	21	-	-	Time 45s
		2023/06/01	09:53:18	1001	39_37.04292'N	142_44.99094'E				
		2023/06/01	10:08:18	1021	39_37.08882'N	142_43.61718'E	1			
		2023/06/01	10:08:18	1021	39_37.08882'N	142_43.61718'E				

2	TEST-9006	2023/06/05	18:50:41	1001	39_42.49692'N	145_31.71660'E	318	-	-	Time 45s
		2023/06/05	18:50:41	1001	39_42.49692'N	145_31.71660'E				
		2023/06/05	22:48:26	1318	40_01.19952'N	145_32.36772'E	1			
		2023/06/05	22:48:26	1318	40_01.19952'N	145_32.36772'E				
3	TEST-9007	2023/06/07	10:22:06	1001	40_42.25932'N	142_22.08444'E	199	-	-	Time 45s
		2023/06/07	10:22:06	1001	40_42.25932'N	142_22.08444'E				
		2023/06/07	12:50:36	1199	40_31.37850'N	142_21.94404'E	1			
		2023/06/07	12:50:36	1199	40_31.37850'N	142_21.94404'E				
4	TEST-9008	2023/06/08	07:49:00	1001	40_14.41620'N	144_11.46240'E	502	-	-	Time 45s
		2023/06/08	07:49:00	1001	40_14.41620'N	144_11.46240'E				
		2023/06/08	14:04:45	1502	39_59.38374'N	143_42.59568'E	1			
		2023/06/08	14:04:45	1502	39_59.38374'N	143_42.59568'E				
5	TEST-9014	2023/06/11	11:02:04	1001	38_57.29400'N	145_34.78374'E	433	-	-	Time 45s
		2023/06/11	11:02:04	1001	38_57.29400'N	145_34.78374'E				
		2023/06/11	16:26:04	1433	39_00.83808'N	145_34.95810'E	1			
		2023/06/11	16:26:04	1433	39_00.83808'N	145_34.95810'E				
6	TEST-9016	2023/06/11	16:31:49	1001	39_00.90948'N	145_34.97160'E	214	-	-	Time 45s
		2023/06/11	16:31:49	1001	39_00.90948'N	145_34.97160'E				
		2023/06/11	19:11:34	1214	39_03.86862'N	145_35.35554'E	1			
		2023/06/11	19:11:34	1214	39_03.86862'N	145_35.35554'E				
7	TEST-9017	2023/06/11	19:12:44	1001	39_03.89502'N	145_35.34948'E	209	-	-	Time 45s
		2023/06/11	19:12:44	1001	39_03.89502'N	145_35.34948'E				
		2023/06/11	21:48:44	1209	39_08.14698'N	145_35.89002'E	1			
		2023/06/11	21:48:44	1209	39_08.14698'N	145_35.89002'E				
8	TEST-9019	2023/06/13	23:12:09	1001	39_33.21384'N	142_25.81944'E	33	-	-	Time 45s
		2023/06/13	23:12:09	1001	39_33.21384'N	142_25.81944'E				
		2023/06/13	23:36:09	1033	39_34.95804'N	142_25.67070'E	1			
		2023/06/13	23:36:09	1033	39_34.95804'N	142_25.67070'E				
Total							1937			

4. Cruise Log

Date	Log
05/29/2023	Departed from Yokosuka, transit to survey area
05/30/2023	Arrival at survey area, XCTD, cable check and maintenance
05/31/2023	Cable check and maintenance
06/01/2023	Cable check and maintenance, Line KJ2306 (for cable condition check), End of Leg 1
06/02/2023	Leg 2 started, Cable check and maintenance, transit to off Hachinohe
06/03/2023	Wait on weather off Hachinohe
06/04/2023	Transit to survey area, XCTD, deployment of the system
06/05/2023	MCS Line KJ2306
06/06/2023	MCS Line KJ2306, air gun shots while line transit, MCS Line KJ2302
06/07/2023	MCS Line KJ2302, air gun shots while line transit, MCS Line KJ2303
06/08/2023	MCS Line KJ2303, air gun shots while line transit, MCS Line KJ2304
06/09/2023	MCS Line KJ2304, recovery of air guns, wait on weather
06/10/2023	Wait on weather, deployment of air guns, MCS Line KJ23D19
06/11/2023	MCS Line KJ23D19, air gun shots while line transit
06/12/2023	Air guns shots while line transit, MCS Line KJ2307
06/13/2023	MCS Line KJ2307
06/14/2023	MCS Line KJ2307, MCS Line KJ2306, MCS Line KJ2322
06/15/2023	MCS Line KJ2322, recovery of the system, XCTD, GNSS-A observation at G09
06/16/2023	Transit to Yokosuka
06/17/2023	Arrived 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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