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R/V Kaimei Cruise Report
KM24-04

High-resolution research of marine seismogenic faults in wide area: Seismic survey and earthquake observation

Japan Trench

May 27, 2024 – Jun. 09, 2024

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

Contents:

1. Cruise Information

● Cruise ID: KM24-04
● Name of vessel: R/V Kaimei
● Title of cruise: High-resolution research of marine seismogenic faults in wide area: Seismic survey and earthquake observation
● Chief Scientist [Affiliation]: Seiichi Miura [JAMSTEC]
● Cruise period: May 27, 2024 – Jun. 09, 2024
● Ports of departure / call / arrival: Yokosuka - Yokosuka
● Research area: Japan Trench
● Research map

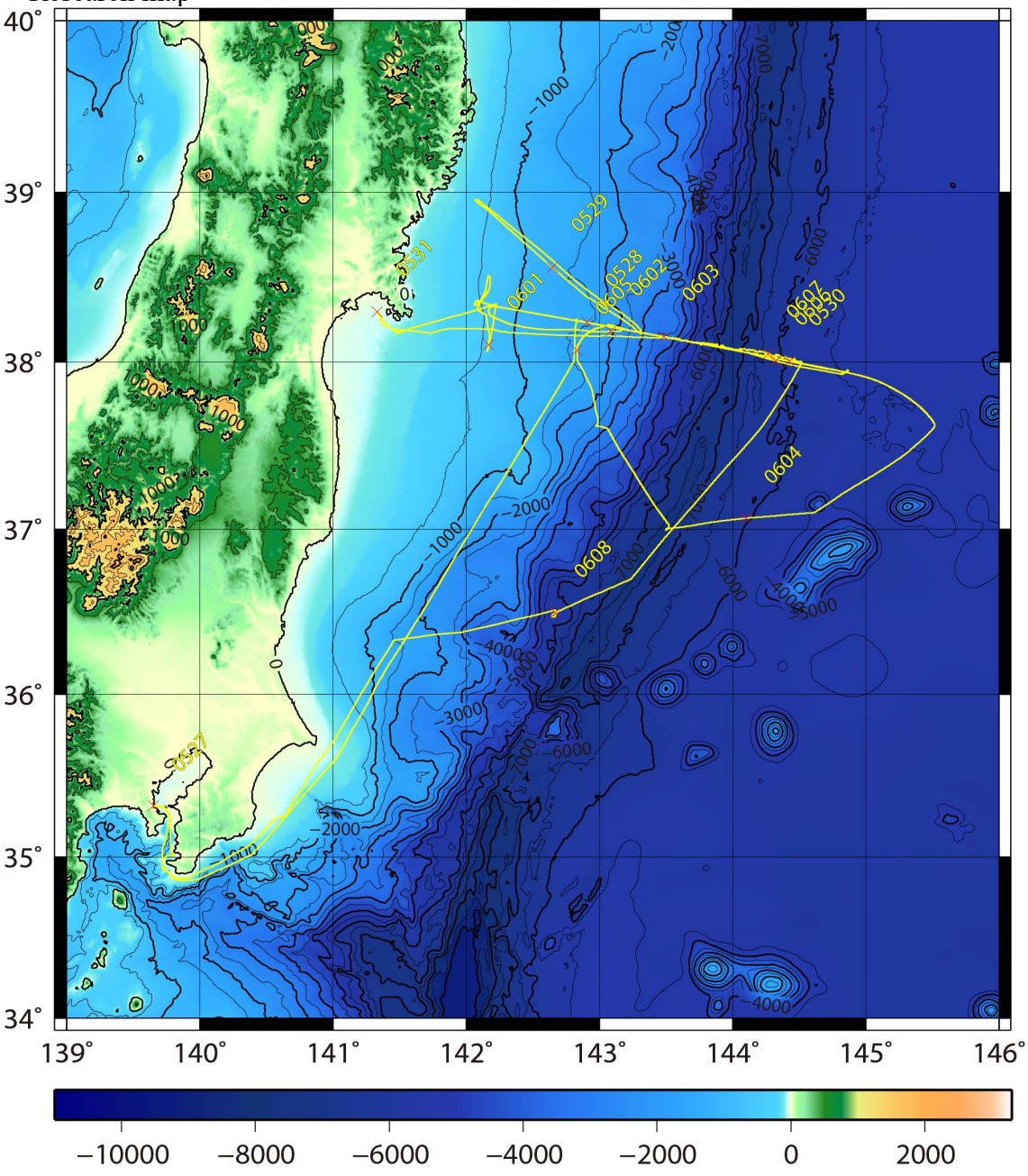

Figure 1: Bathymetry map and ship track of KM24-04 cruise. Yellow shows the ship track.

2. Research Proposal and Science Party

● Title of proposal:
High-resolution research of marine seismogenic faults in wide area: Seismic survey and earthquake observation

● Representative of Science Party:
Seiichi Miura [JAMSTEC]

● Science Party:

Seiichi Miura	[JAMSTEC]
Gou Fujie	[JAMSTEC]
Yasuyuki Nakamura	[JAMSTEC]
Yuka Kaiho	[JAMSTEC]
Ayako Nakanishi	[JAMSTEC]
Ryuta Arai	[JAMSTEC]
Kazuya Shiraishi	[JAMSTEC]
Yanfang Qin	[JAMSTEC]
Tetsuo No	[JAMSTEC]
Ryo Miura	[JAMSTEC]
Koichiro Obana	[JAMSTEC]
Tsutomu Takahashi	[JAMSTEC]
Takashi Tonegawa	[JAMSTEC]
Takane Hori	[JAMSTEC]
Takeshi Iinuma	[JAMSTEC]
Yojirou Yamamoto	[JAMSTEC]
Yasushi Ishihara	[JAMSTEC]
Ryota Hino	[Tohoku University]
Motoyuki Kido	[Tohoku University]
Tetsuro Tsuru	[Tokyo Univ. of Marine Science and technology]
Jin-Oh Park	[University of Tokyo]
Rie Nakata	[University of Tokyo]
Shuichi Kodaira	[JAMSTEC]

● Onboard Scientist

Seiichi Miura	[JAMSTEC]
Ryo Miura	[JAMSTEC]

● Onboard Technician

Yuki Owatari	[NME]
Hikaru Iwamaru	[NME]
Yoshiki Horiuchi	[NME]
Kenya Yamanaka	[NME]
Haruki Doi	[NME]
Naoto Noguchi	[NME]
Makoto Ito	[NME]
Toshimasa Nasu	[NME]
Taro Shirai	[NME]
Toshinori Saijo	[NME]

Natsune Iho	[NME]
Masanori Yokoi	[NME]
Tatsuya Sugiyama	[NME]
Yuta Suzuki	[NME]

● Crew

Master	Naoto Kimura	[NME]
Chief Officer	Akira Suzuki	[NME]
1st Officer	Ryo Yamaguchi	[NME]
2nd Officer	Tatsumi Deguchi	[NME]
3rd Officer	Shun Ito	[NME]
Jr.3rd Officer	Yuya Ikeda	[NME]
Officer	Hiroki Okamoto	[NME]
Chief Engineer	Minoru Tsukada	[NME]
1st Engineer	Takahiro Mori	[NME]
2nd Engineer	Katsuto Yamaguchi	[NME]
3rd Engineer	Tomoya Koga	[NME]
Chief Electronics Operator	Tokinori Nasu	[NME]
2nd Electronics Operator	Ryuji Onikubo	[NME]
3rd Electronics Operator	Kohei Ikeda	[NME]
Jr.3rd Electronics Operator	Fumine Okada	[NME]
Boat Swain	Masanori Ohata	[NME]
Able Seaman	Tatsuo Fujii	[NME]
Able Seaman	Saikan Hirai	[NME]
Able Seaman	Takuya Miyashita	[NME]
Able Seaman	Shinya Ueno	[NME]
Able Seaman	Takumi Miura	[NME]
Sailor	Yuta Kiyota	[NME]
Sailor	Taisuke Yokoyama	[NME]
No.1 Oiler	Hiroyuki Oishi	[NME]
Oiler	Ryota Suzuki	[NME]
Oiler	Seiya Watanabe	[NME]
Oiler	Tamaki Fujishima	[NME]
Assistant Oiler	Marina Shimizu	[NME]
Assistant Oiler	Kiyoyuki Kubo	[NME]
Chief Steward	Yukihide Chikuba	[NME]
Steward	Masanao Kunita	[NME]
Steward	Takehiro Nojiri	[NME]
Steward	Yoshitaka Yamamoto	[NME]
Steward	Taku Kato	[NME]

3. Research/Development Activities

● Purpose and background:

The cruise KM24-04 aims at revealing three-dimensional geometry and physical property in the Chishima and Japan Trenches as described in the mid-term to long-term research plan of JAMSTEC. In the large deformation area of the 2011 Tohoku earthquake, we carried out deployment of 70 ocean bottom seismometers (OBS), airgun shooting of wide-angle reflection/refraction experiment, multi-channel reflection seismic survey (MCS) using a hydrophone streamer cable, and 20 OBS retrieval.

● List of observations

(1) OBS deployment

OBS were lifted up by a crane at the end of the ship, and released by opening the hook of the crane at the sea level. OBS descended by the anchor weight to the seafloor. During the descending, acoustic communication between the ship and OBS was conducted to monitor the OBS location.

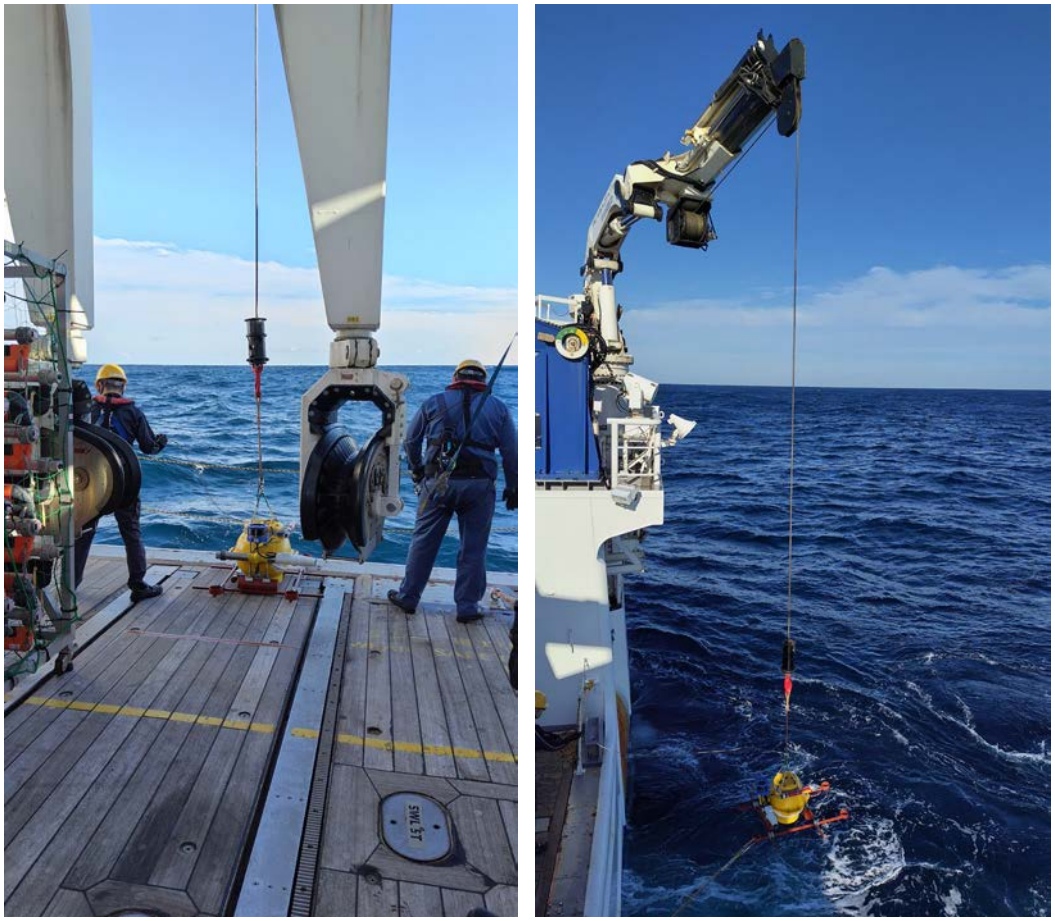

Figure 2: OBS deployment.

(2) Wide-angle reflection/refraction survey

For the wide-angle reflection and refraction survey, an airgun array of 10,600 cu. in. fired every 200-m on the A4d seismic line.

Figure 3: Airgun array of the R/V Kaimei.

(3) Multi-channel reflection seismic survey (MCS)

To acquire the reflection signal, we toad a multi-channel hydrophone streamer cable of 6-km length. Airgun shooting interval was 50-m in a part of A4d line.

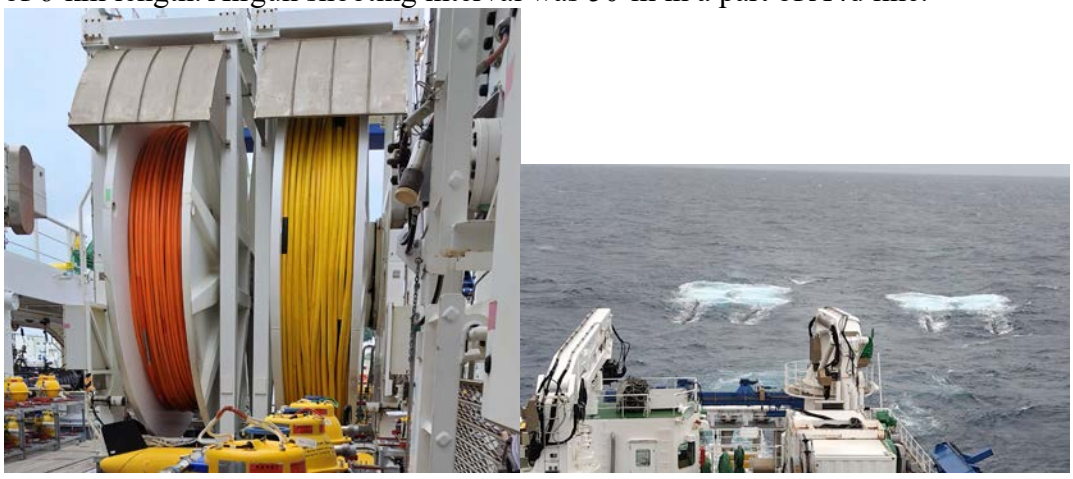

Figure 4: Multi-channel hydrophone streamer cables. In this cruise, we used the yellow one (Left). Babbles of airgun shooting (Right).

(4) OBS retrieval

After the MCS survey, we retrieved OBS mainly in the middle part of the A4d seismic line. For the OBS retrieval, acoustic signals were sent from the ship to OBS to release the iron weight. After that, OBS ascended by buoyancy to the sea surface, and picked up by the hook and crane

Figure 5: OBS retrieval.

(5) Bathymetry, magnetic, gravity

Bathymetry, magnetometer, and gravity data were acquired during the cruise. Bathymetry data was recorded by Kongsberg EM712 and ME122 for shallow and deep water depth, respectively. Effective depth ranges of those two systems are respectively from 3m to 3600m and from 20 to 11000m. Magnetic data was acquired by SFG-2015 three component magnetometer of TERATECHNICA Inc. Gravity meter is Marine Gravity Meter MGS-6 of Micro-g LaCoste Inc.

(6) XBT (eXpendable-Bathy Thermograph) and XCTD (eXpendable-Conductivity, Temperature and Depth)

Three XBT and two XCTD casts were conducted during the cruise to obtain seawater temperature and salinity.

(7) GNSS-A (Global Navigation Satellite System – Acoustic ranging combination technique)

We conducted one GNSS-A observation at the station G19 about 6-hours to measure the location of the geodetic station.

4. Cruise Log

Date		Remark
2024/5/27	Monday	Embarkment to R/V Kaimei at Yokosuka HQ. Departure from Yokosuka HQ. Transit to OBS011.
2024/5/28	Tuesday	OBS deployment from OBS011 to OBS033. Transit to off-Iwate for evacuation from a depression.
2024/5/29	Wednesday	Transit to OBS034. Restart OBS deployment (OBS034-OBS059).
2024/5/30	Thursday	OBS deployment (OBS060-OBS096). Transit to off Miyagi.
2024/5/31	Friday	Stay near the coast off Miyagi.
2024/6/1	Saturday	Transit to the westernmost point of the A4d line. Deployment of the airgun array and start shooting for wide-angle reflection/refraction data.
2024/6/2	Sunday	Continued wide-angle reflection/refraction survey, and MCS survey
2024/6/3	Monday	MCS survey
2024/6/4	Tuesday	Stay at the Japan Trench for evacuation from storm
2024/6/5	Wednesday	Airgun shooting
2024/6/6	Thursday	Airgun shooting, OBS retrieval
2024/6/7	Friday	OBS retrieval
2024/6/8	Saturday	GNSS-A observation, Transit to Yokosuka
2024/6/9	Sunday	Arrival to Yokosuka port. Disembarkment.

●OBS Location

OBS	Latitude			Longitude			Depth	Status
OBS011	38	14.7733	N	142	48.6948	E	1409	Deployment
OBS012	38	14.6008	N	142	50.1564	E	1391	Deployment
OBS013	38	14.4492	N	142	51.4323	E	1407	Deployment
OBS014	38	14.2819	N	142	52.7789	E	1438	Deployment
OBS015	38	14.0996	N	142	54.0949	E	1440	Deployment
OBS016	38	13.8612	N	142	55.4446	E	1493	Deployment

OBS017	38	13.6949	N	142	56.8375	E	1497	Deployment
OBS018	38	13.4718	N	142	58.1911	E	1542	Deployment
OBS019	38	13.3279	N	142	59.5380	E	1586	Deployment
OBS020	38	13.1259	N	143	0.8834	E	1591	Deployment
OBS021	38	12.9335	N	143	2.2202	E	1629	Deployment
OBS022	38	12.7287	N	143	3.5662	E	1753	Deployment
OBS023	38	12.5345	N	143	4.9103	E	1830	Deployment
OBS024	38	12.3629	N	143	6.2756	E	1899	Deployment
OBS025	38	12.1432	N	143	7.6072	E	1960	Deployment
OBS026	38	11.9445	N	143	8.9726	E	2052	Deployment
OBS027	38	11.7498	N	143	10.3230	E	2192	Deployment
OBS028	38	11.5416	N	143	11.6772	E	2292	Deployment
OBS029	38	11.3723	N	143	13.0199	E	2411	Deployment
OBS030	38	11.1810	N	143	14.3735	E	2545	Deployment
OBS031	38	10.9274	N	143	15.6953	E	2644	Deployment
OBS032	38	10.7995	N	143	17.1804	E	2794	Deployment
OBS033	38	10.5975	N	143	18.5496	E	2889	Deployment
OBS034	38	10.4147	N	143	19.7252	E	2976	Deployment
OBS035	38	10.1812	N	143	21.1212	E	3100	Deployment
OBS036	38	9.9542	N	143	22.4615	E	3213	Deployment
OBS037	38	9.7068	N	143	23.8058	E	3317	Deployment
OBS038	38	9.5786	N	143	25.1668	E	3458	Deployment
OBS039	38	9.3708	N	143	26.5273	E	3498	Deployment
OBS040	38	9.1692	N	143	27.8797	E	3497	Deployment
OBS041	38	8.9459	N	143	29.2000	E	3506	Deployment
OBS042	38	8.7167	N	143	30.4991	E	3518	Deployment
OBS043	38	8.5338	N	143	31.8802	E	3658	Deployment
OBS044	38	8.3272	N	143	33.2218	E	3694	Deployment
OBS045	38	8.0873	N	143	34.6010	E	4027	Deployment
OBS046	38	7.8942	N	143	35.9512	E	4386	Deployment
OBS047	38	7.7404	N	143	37.2382	E	4559	Deployment
OBS048	38	7.4589	N	143	38.6088	E	4667	Deployment
OBS050	38	7.1011	N	143	41.2668	E	5159	Deployment
OBS051	38	6.8089	N	143	42.6638	E	5408	Deployment

OBS053	38	6.6233	N	143	44.6483	E	5537	Deployment
OBS054	38	6.2491	N	143	46.5372	E	5621	Deployment
OBS056	38	5.8182	N	143	49.3530	E	6091	Deployment
OBS057	38	5.8758	N	143	50.9654	E	6364	Deployment and retrieval
OBS059	38	5.2813	N	143	53.7183	E	7037	Deployment and retrieval
OBS060	38	5.7843	N	143	55.0546	E	7182	Deployment and retrieval
OBS062	38	4.7241	N	143	57.8758	E	7302	Deployment and retrieval
OBS063	38	4.8778	N	143	58.9007	E	7514	Deployment and retrieval
OBS065	38	4.6675	N	144	1.8997	E	7322	Deployment and retrieval
OBS066	38	4.5117	N	144	3.2602	E	7501	Deployment and retrieval
OBS068	38	4.0240	N	144	5.8066	E	6924	Deployment and retrieval
OBS069	38	3.7821	N	144	7.0980	E	6908	Deployment and retrieval
OBS071	38	3.3879	N	144	9.8946	E	6643	Deployment and retrieval
OBS072	38	3.1371	N	144	11.3423	E	6600	Deployment and retrieval
OBS074	38	2.6006	N	144	13.9463	E	6307	Deployment and retrieval
OBS075	38	2.2217	N	144	14.7816	E	6458	Deployment and retrieval
OBS077	38	1.7459	N	144	17.6691	E	6318	Deployment and retrieval
OBS078	38	1.5333	N	144	18.9499	E	6200	Deployment and retrieval
OBS080	38	0.9734	N	144	21.7656	E	6051	Deployment and retrieval
OBS081	38	0.8120	N	144	23.0037	E	5985	Deployment and retrieval
OBS083	38	0.3896	N	144	25.6583	E	5949	Deployment and retrieval
OBS084	38	0.1580	N	144	27.0424	E	5896	Deployment and retrieval
OBS086	37	59.7193	N	144	29.6244	E	6042	Deployment and retrieval
OBS087	37	59.5058	N	144	30.9974	E	5970	Deployment
OBS089	37	59.0599	N	144	33.6577	E	5832	Deployment
OBS090	37	58.8815	N	144	35.0080	E	5745	Deployment
OBS092	37	58.4366	N	144	37.6744	E	5704	Deployment
OBS093	37	58.2533	N	144	39.0121	E	5642	Deployment
OBS095	37	57.8340	N	144	41.6982	E	5622	Deployment
OBS096	37	57.6400	N	144	43.0814	E	5599	Deployment

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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