



R/V Hakuho-maru Cruise Report
KH-25-JE01

Quick response survey
for the 2024 Noto Peninsula Earthquake



Off Noto Peninsula, Japan Sea

Jan. 7, 2025-Jan. 19, 2025

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

Contents

1. Cruise Information
2. Research Proposal and Science Party
3. Research/Development Activities
4. Cruise Log
5. Notice on Using

1. Cruise Information

- Cruise ID:
KH-25-JE01
- Name of vessel:
R/V Hakuho-maru
- Title of project:
Quick Response Survey for the 2024 Noto Peninsula Earthquake
- Title of cruise:
Quick Response Survey for the 2024 Noto Peninsula Earthquake
- Chief Scientist [Affiliation]:
Tsutomu Takahashi [JAMSTEC]
- Cruise period:
Jan. 7, 2025-Jan. 19, 2025
- Ports of departure / call / arrival:
Moji / - / Niigata
- Research area :
Off Noto Peninsula, Japan Sea
- Research map

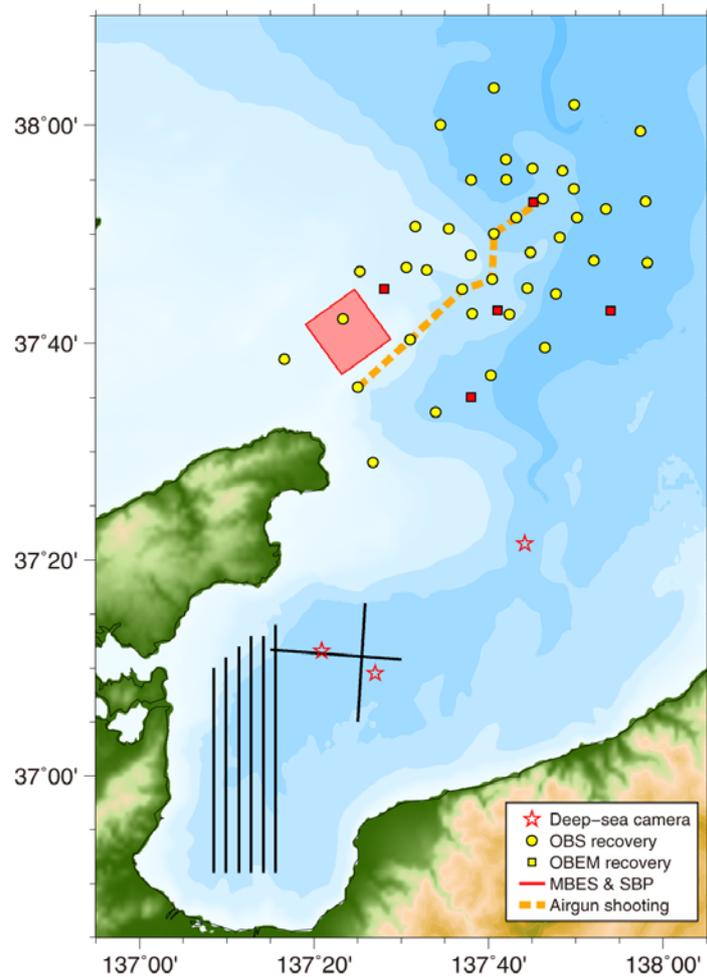


Fig. 1. Map view of survey sites of KH-25-JE01 cruise. Circles and squares represent positions of OBSs and OBEMs for recovery, respectively. Black lines are bathymetry and sub-bottom profile survey lines. Stars represent deep-sea camera operation sites. Orange dashed line is a route of air-gun shooting for OBS. Red-box is the MCS survey area.

KH-25-JE01_1

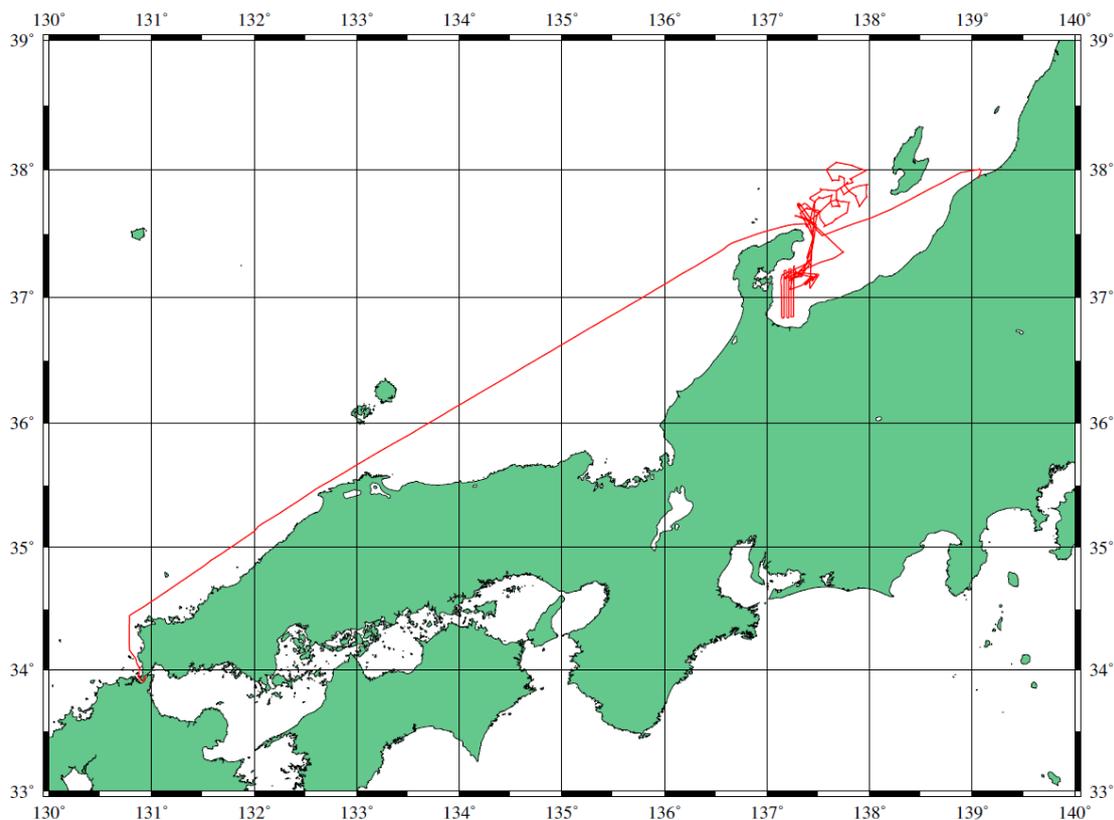


Fig. 2. Ship track during KH-25-JE01 cruise

2. Research Proposal and Science Party

- Title of proposal:

Quick Response Survey for the 2024 Noto Peninsula Earthquake

- Representative of Science Party [Affiliation]

Gou Fujie [JAMSTEC]

- Science Party (List) [Affiliation, assignment etc.]

Onboard Scientists and Technicians:

Tsutomu Takahashi	JAMSTEC
Takafumi Kasaya	JAMSTEC
Tomoaki Yamada	Earthquake Research Institute, The university of Tokyo (ERI, U. Tokyo)
Hideji Abe	ERI, U. Tokyo
Hironori Otsuka	ERI, U. Tokyo
Ryosuke Azuma	Tohoku Univ.
Shuichi Suzuki	Tohoku Univ.
Ayumu Mizutani	Tohoku Univ.
Shun Fukushima	Tohoku Univ.
Hisatoshi Baba	Tokai Univ.
Ryoji Koyama	Tokai Univ.
Jin-Oh Park	Atmosphere and Ocean Research Institute (AORI), U. Tokyo
Mohammadigheymasi Hamzeh	AORI, U. Tokyo
Katsura Kameo	AORI, U. Tokyo

Ryouji Toda	AORI, U. Tokyo
Yue Sun	AORI, U. Tokyo
Fan Yu	AORI, U. Tokyo
Yige YANG	AORI, U. Tokyo
Yang ZHAO	AORI, U. Tokyo
Masayuki Toizumi	Nippon Marine Enterprise, Ltd. (NME)
Makoto Ito	NME
Ikumasa Terada	NME
Hidenori Shibata	NME
Takuya Maekawa	NME
Taro Shirai	NME
Yuki Ohwatari	NME
Yoshiki Horiuchi	NME
Shou Suzuki	NME
Hisanori Iwamoto	NME
Toshikatsu Nasu	NME
Yu Suzuki	MOL Marine & Engineering Co., Ltd. (MOLMEC)
Haruka Sato	MOLMEC

Onshore Scientists:

Gou Fujie	JAMSTEC
Koichiro Obana	JAMSTEC
Tetsuo No	JAMSTEC
Yasuyuki Nakamura	JAMSTEC
Seiichi Miura	JAMSTEC
Masanao Shinohara	ERI, U. Tokyo

3. Research/Development Activities

1. Objective

The 2024 Noto Peninsula earthquake (M7.6) occurred on Jan. 1, 2024 at Noto peninsula, Japan. Strong ground motion and tsunami of this earthquake caused extensive damage in the Noto Peninsula and surrounding areas. JAMSTEC and universities in Japan conducted quick response surveys to understand the fault geometries, focal mechanisms and tsunami generation process, and subsequent seismic activities at the offshore part of the source area. In this cruise, we recovered ocean bottom seismographs (OBS) and ocean bottom electromagnetometers (OBEM) that were deployed for up to one year.

We also conducted surveys of bathymetry and subsurface structures to investigate their spatial and temporal variations. Air-gun shooting was conducted above several OBSs to investigate subsurface structure just beneath the OBSs. We also acquired bathymetry data to examine their temporal variations before and after the M7.6 earthquake. Subsurface acoustic profiles were acquired with the bathymetry data to investigate detailed subsurface structures near the seafloor. Multichannel seismic reflection survey was conducted off northeast of the Noto Peninsula to understand detailed structures of a fault segment of the M7.6 earthquake. Trial operations of a deep-sea camera system were conducted to observe the seafloor at Toyama Bay and a location where bathymetry changes before and after the earthquake were observed.

2. Activities

2.1 Air-gun shooting for OBS

We firstly conducted an air-gun shooting along a route that passes just above several OBSs (L16B, L12B, J54D, J52D, J57D, L03A, J45D) to estimate subsurface structures beneath the OBSs (orange dashed line is Fig. 2 and Fig. 3). Shooting interval was 40 s, and the number of shooting was 498.

2.2 OBS recovery

We recovered 39 OBSs off northeast of the Noto peninsula. Recovered OBSs are short-period OBSs (SPOBS) of JAMSTEC, long-term OBSs (LTOBS) of ERI, and compact broadband OBSs

(CBBOBS) of ERI. SPOBS consists of a three-components geophone (4.5 Hz) and a hydrophone. LTOBS and CBBOBS are equipped with 1 Hz and 120 s seismometer, respectively. SPOBSs had been deployed during a cruise of Kaiyomaru-No.2 (Kaiyo Engineering, Corp.) in Sep. 2024. Deployed positions of SPOBSs had been measured by a triangular ranging during the Kaiyomaru-No.2 cruise. LTOBSs and CBBOBSs had been deployed during KH-24-JE01 or KH-24-JE02C cruise. Deployed positions of LTOBSs and CBBOBSs had been calibrated using the acoustic navigation system (ANS) of R/V Hakuho-maru.

The SPOBS at site J52D could not be recovered because this OBS never responded to any acoustic commands from the R/V Hakuho-maru.

2.3 OBEM recovery

We recovered 4 OBEMs off northeast of the Noto peninsula. These OBEMs had been deployed during KH-24-JE02C cruise. Their deployed positions had been calibrated using the ANS of R/V Hakuho-maru during KH-24-JE02C cruise. The OBEM at E03B site could not be released from the seafloor although it could respond to acoustic commands from the vessel.

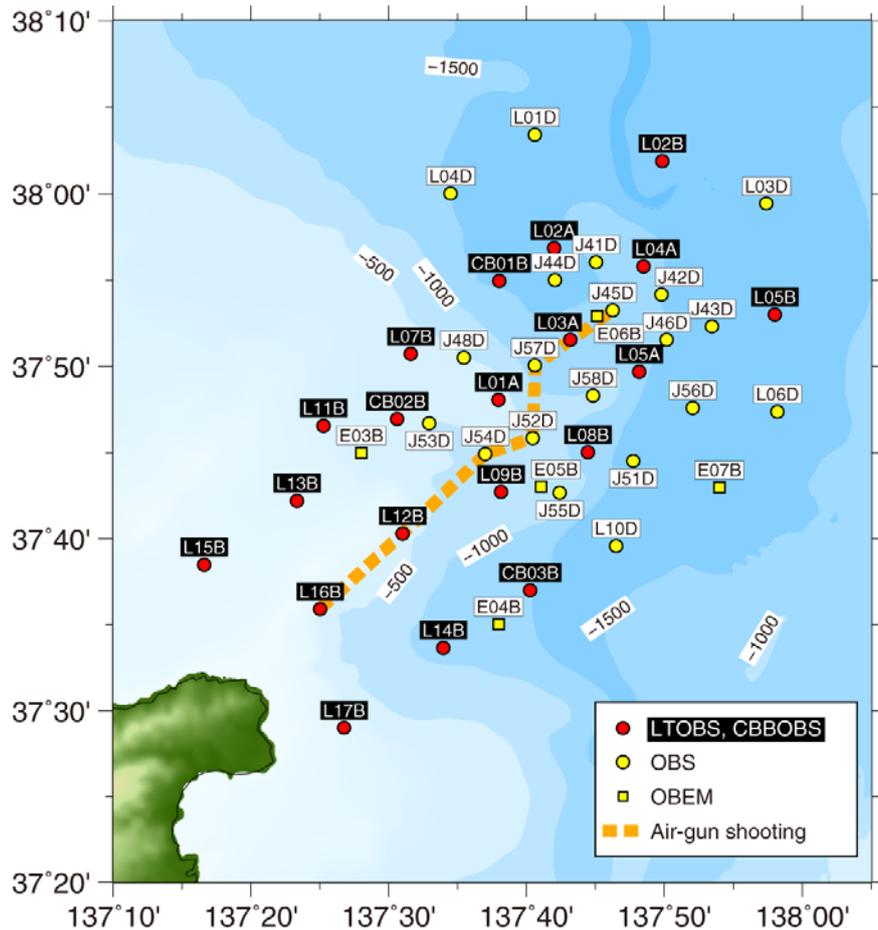


Fig. 3. Positions of OBSs and OBEMs for recovery. Orange dashed line is the route of air-gun shooting for OBSs.

2.4 Bathymetry and sub bottom profile surveys

Bathymetry data and subsurface acoustic profiles were acquired using the Multi beam echo sounder (MBES) and sub bottom profiler (SBP) throughout the cruise except during acoustic communication with OBS. We also conducted grid surveys of MBES and SBP at Toyama Bay.

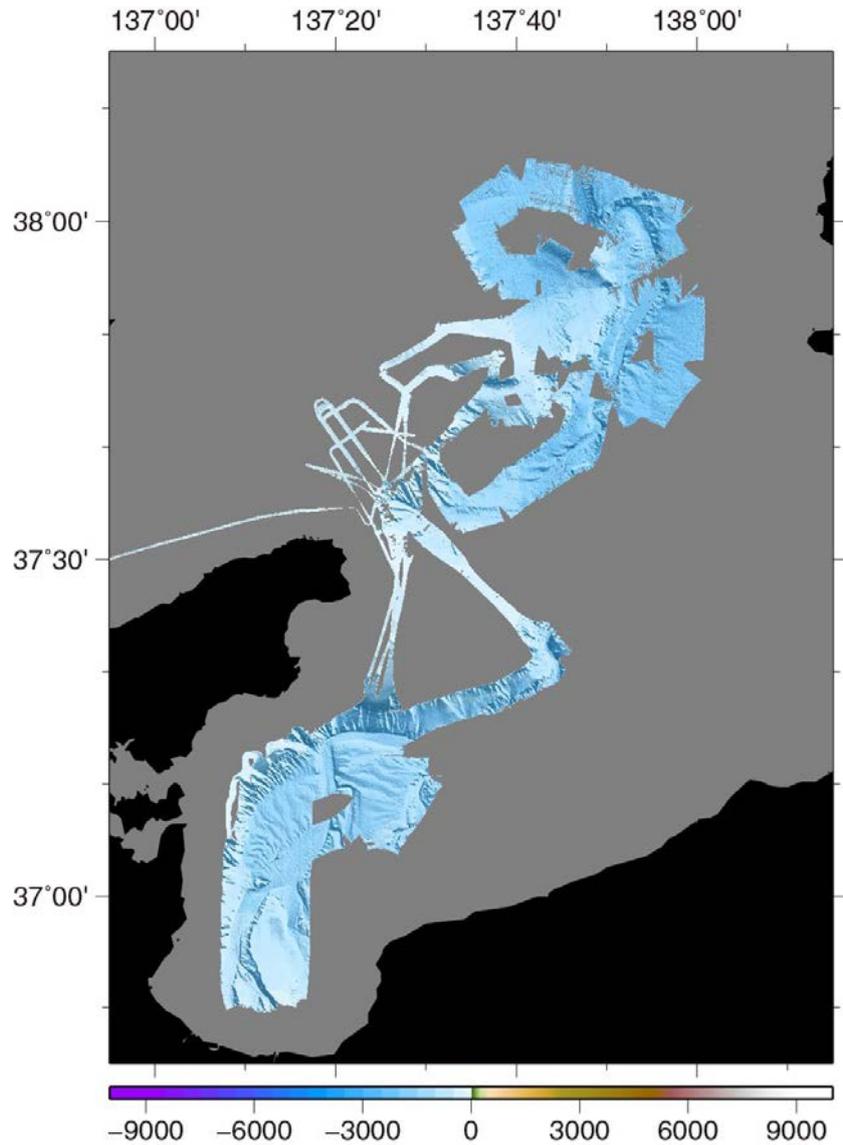


Fig 3. Bathymetry data acquired during KH-25-JE01 cruise.

2.5 Deep-sea Camera

We conducted trial operations of a deep-sea camera system at Toyama-bay and at a location where bathymetry changed before and after the earthquake were observed. This deep-sea camera system consists of 2 action-cameras and 2 light emitting diode (LED) lights that were constructed by AORI. Each camera is stored within a pressure resistant cylinder. Cameras and LEDs were mounted on a metal-frame that is generally used to tow the Proton magnetometer. We added some weights, so that the total weight of the system becomes approximately 400 kg. The acoustic transponder and pinger were attached 50m and 20m above this camera system, respectively.

We conducted 3 dives of this system. The first and second dives at Toyama Bay successfully recorded the seafloor continuously. The third dive at the point where the bathymetry changed captured the seafloor only for a short time due to a large offset from the seafloor.



Fig. 4. A capture of the movie during the 1st-dive of the deep-sea camera at Toyama-bay.

2.6 MCS survey

Multichannel seismic reflection survey was conducted off northeast of the Noto peninsula. The length of each survey line is 10 km, and separation distance between adjacent lines is 50 m. We acquired MCS data along 9 survey lines listed below. The length of streamer cable is about 2000 m (288 Ch.), and the source consists with 2 GI-guns (355 cu.in. 2000 PSI).

Table 1. List of MCS survey lines

Line name	Northwester endpoint		Southeaster endpoint	
	Latitude (deg.)	Longitude (deg.)	Latitude (deg.)	Longitude (deg.)
Line1	37.695153	137.317170	37.618732	137.386454
Line2	37.695423	137.317637	37.619002	137.386921
Line3	37.695694	137.318104	37.619273	137.387388
Line4	37.695964	137.318571	37.619544	137.387855
Line5	37.696234	137.319037	37.619814	137.388322
Line51	37.708662	137.340515	37.632266	137.409799
Line52	37.708932	137.340982	37.632536	137.410266
Line53	37.709202	137.341449	37.632807	137.410733
Line54	37.709472	137.341916	37.633078	137.411200

2.7 Drone flights

Drone flights were conducted to take movies of OBS and OBEM recovery, air-gun deployment, and MCS survey.

4. Cruise Log

2025/1/7	Standby at Moji-port due to bad sea conditions.
2025/1/8	Departure from Moji-port Standby off north of Mutsure-jima due to bad sea conditions.
2025/1/9	Standby off north of Mutsure-jima due to bad sea conditions.
2025/1/10	Standby off north of Mutsure-jima due to bad sea conditions.

	Transit to the survey area.
2025/1/11	Transit to the survey area. Air-gun shooting (from L16B to J45D) OBS recovery (J45D, J42D) A drone flight during air-gun deployment.
2025/1/12	Recovery of OBS (L04A, L03D, L02B, L01D, L04D, CB01B, J44D, L02A, J41D, L05A, J56D, L06D, L05B, J43D) and OBEM (E06B, E07B). Drone flights during OBS and OBEM recovery.
2025/1/13	Recovery of OBS (J46D, J58D, L03A, J57D, J48D, L07B, L11B, CB02B, J53D, L01A, J54D, L09B, J55D, L08B, J51D, L10D) and OBEM (E05B).
2025/1/14	Recovery of OBS (CB03B, L14B, L12B, L13B, L17B) and OBEM (E04B) recovery. Operation of a deep-sea camera system at Toyama Bay. MBES/SBP survey at Toyama-bay.
2025/1/15	OBS recovery at L15B. Operation of a deep-sea camera system at Toyama-bay.
2025/1/16	OBEM calibration at E03B. OBS recovery at L16B. Operation of a deep-sea camera. Standby at Toyama Bay due to bad sea conditions.
2025/1/17	Standby at Toyama Bay due to bad sea conditions. MBES/SBP surveys at Toyama Bay.
2025/1/18	MCS survey off northeast of the Noto peninsula.
2025/1/19	Transit to Niigata. Arrival at Niigata-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.
Users of information on this report are requested to submit Publication Report to JAMSTEC.

<https://www.godac.jamstec.go.jp/darwin/en/note.html#report>

E-mail: submit-rv-cruise@jamstec.go.jp