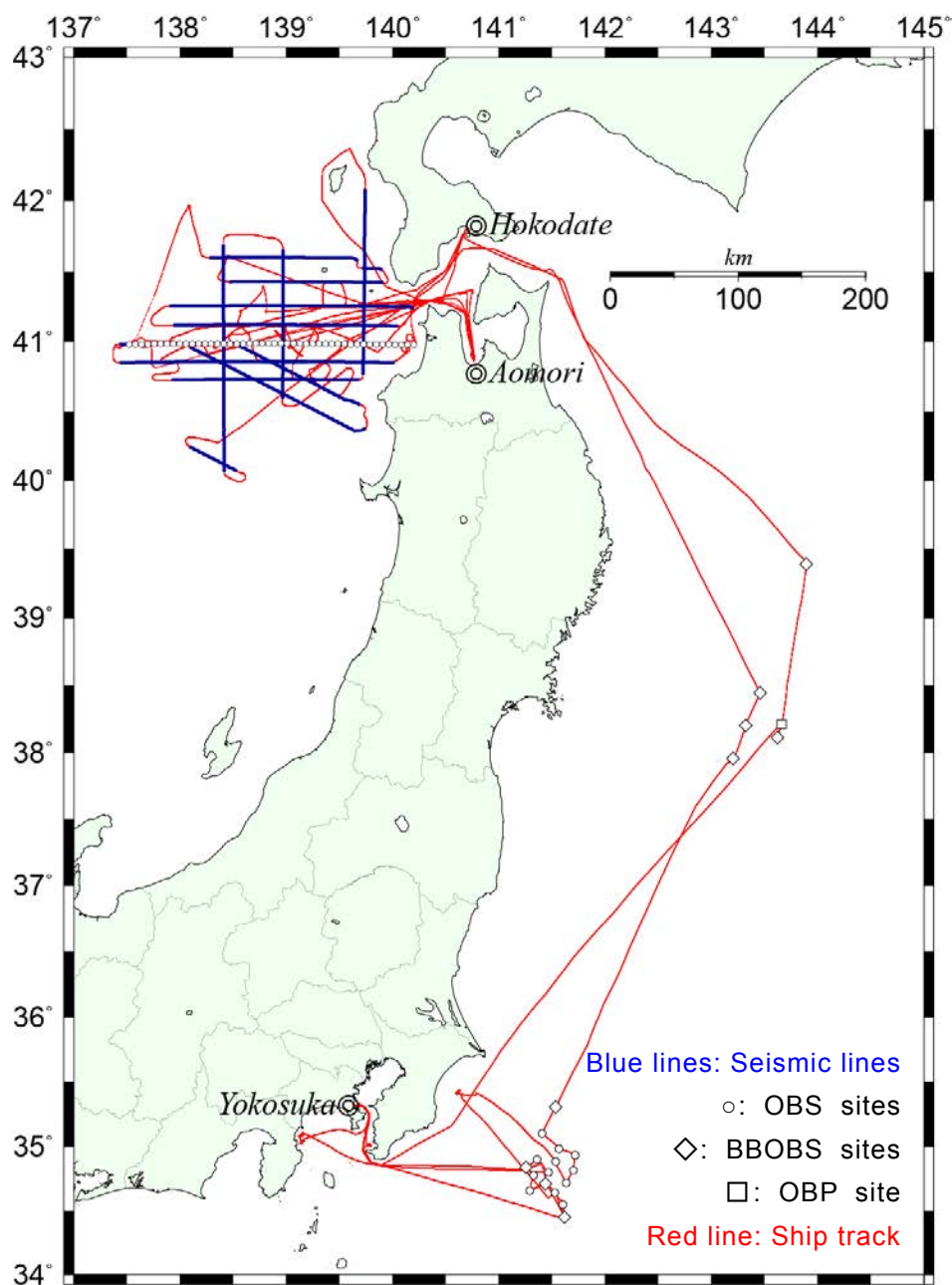


Cruise summary

1. Cruise Information :

- (1) **Cruise number, Ship name:** KR12-10, R/V Kairei
- (2) **Title of the cruise:** 2012FY “Intensive seismic study around the deformed zone in the eastern margin of the Japan Sea”
- (3) **Chief Scientist [Affiliation]:** Tetsuo NO [JAMSTEC]
- (4) **Representative of Science Party [Affiliation]:** Yoshiyuki KANEDA [JAMSTEC],
- (5) **Title of proposal:** Intensive seismic study around the deformed zone in the eastern margin of the Japan Sea
- (6) **Cruise period, Port call:** 2012/4/2 - 5/13, Yokosuka port (JAMSTEC) to Yokosuka port (JAMSTEC)
- (7) **Research Area:** The eastern margin of the Japan Sea and the Japan Trench
- (8) **Research Map:**



2. Overview of Observation :

(1) Objectives :

In April - May 2012, we conducted a marine seismic exploration survey around areas off Nishi-Tsugaru and Southwest Hokkaido which are two lines of strain concentration in the survey area (Okamura et al., 1995). Moreover, the survey area is located in the northern hypocentral region of the 1983 Nihonkai-Chubu earthquake. The northern part of survey area is the Matsumae plateau and the Okushiri basin which located in seismic gap (Ohtake, 2002). The western part is the Japan Basin and the eastern part is the Nishi-tsugaru basin and the continual shelf. We can understand these crustal structures from the seismic exploration data of this survey; besides, we carry out seismotectonic and growth structure studies off the shore of Aomori and Hokkaido.

On the way to the Japan Sea and Yokosuka, we were carried out BBOBS (Broadband Ocean Bottom Seismometer) recover, OBS (Ocean Bottom Seismometer) deployment, and OBP (Ocean Bottom Pressure gauge) deployment off Boso and off Miyagi. The aims of these observations are the studies of earthquakes and tsunami which are occurred in the offshore area from Sanriku to Boso.

(2) List of observation instruments :

1) Multichannel seismic reflection survey (MCS):

We conducted a MCS survey around the areas off Nishi-Tsugaru and Southwest Hokkaido in the eastern margins of the Japan Sea using the R/V KAIREI. MCS data were acquired along 13 lines with a total length of approximately 1,965 km. Survey lines were crooked to avoid the many fishing operations and equipment in the survey area. We shot a tuned airgun array with a spacing of 50 m. This array has a total capacity of 7,800 cubic inches (about 130 liters). The standard air pressure was 2,000 psi (about 14 MPa). During the shooting, we towed a 444-channel hydrophone streamer cable with about 5700-m maximum offset, and the group interval was 12.5 m. The towing depth of the streamer cable was maintained at 12 m below the sea surface using depth controllers. The sampling rate was 2 ms, and the recording length was 16 s.

2) Refraction survey using OBSs:

We deployed 46 OBSs at the EMJS1205, and performed a refraction survey using an airgun array with a spacing of 200 m. The airgun array in the OBS survey used the same configuration as in the MCS survey. The interval of the OBS deployment was about 5 km. An OBS is deployed by freefall and retrieved by melting releaser composed of stainless steel plates connecting the OBS with a weight when a transponder system receives acoustic signal sent from a vessel. This acoustic communication between the OBS and the vessel was performed using transducers installed on the vessel. The position of OBSs on the seabed was estimated by a SSBL (Super short base line acoustic system) of the vessel's positioning system during the cruise. We edited the continuous OBS data to a length of 70 s. At the same time, calibration of the OBS clock for GPS time was carried out using difference times between the OBS clock and GPS time, which were measured just before OBS deployment and just after OBS retrieval.

3) BBOBS recover and OBS deployment off Boso and off Miyagi

We deployed 12 OBSs and calibrated the location of BBOBSs deployed in MR12-E01 off Boso area. 12 OBSs were launched by rear small crane. We communicated with sinking OBS using the acoustic transponder down to about 300-500 m below the sea surface. Each OBS can record seismic signal for about one year. We calibrated the location of BBOBS stations by measuring slant range between R/V Kairei and the settled BBOBS at three points around the launching position. About off Miyagi area, we successfully recovered five BBOBSs deployed in NT11-E02 and deployed one OBP. In recovery operation, we communicated with BBOBSs using the acoustic transponder to shut down running recording equipment and sent out command to release. After BBOBSs were floating on the sea surface, they were taken from the sea over starboard side. OBP was launched by rear small crane.

4) Bathymetry, magnetic, and gravity observations:

Bathymetry, magnetic, and gravity data were recorded continuously during the survey.