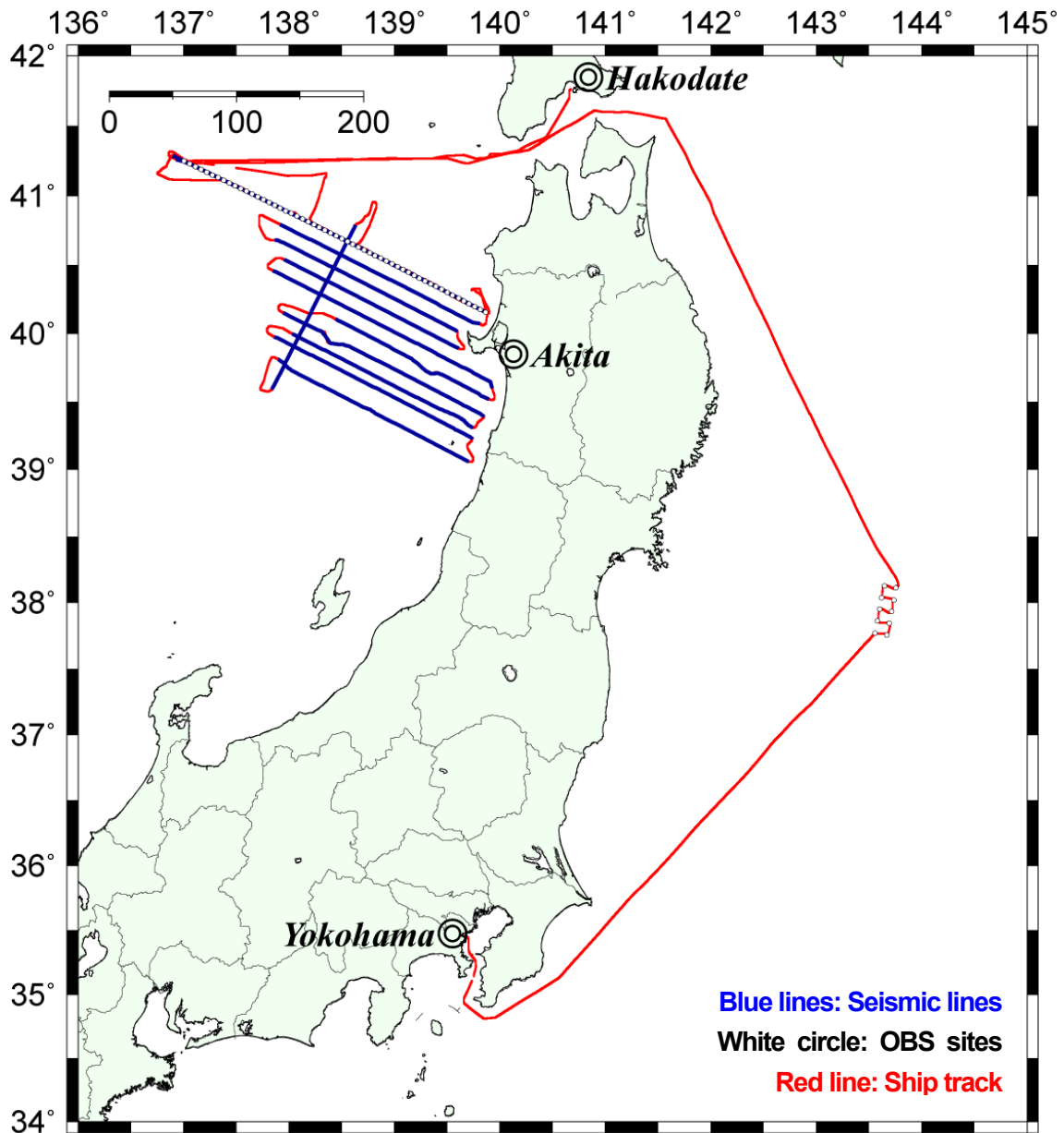


## Cruise summary

### 1. Cruise Information :

- (1) **Cruise number, Ship name:** KR11-08, R/V Kairei
- (2) **Title of the cruise:** 2011FY “Seismic intensive 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:** Seismic intensive study around the deformed zone in the eastern margin of the Japan Sea
- (6) **Cruise period, Port call:** 2011/8/5 - 8/27, Yokohama port to Hakodate port
- (7) **Research Area:** The eastern margin of the Japan Sea and the Japan Trench
- (8) **Research Map:**



## **2. Overview of Observation :**

### **(1) Objectives :**

In August 2011, we conducted a marine seismic exploration survey around areas off Akita and Yamagata. There are two lines of strain concentration in the survey area (Okamura et al., 2007). Moreover, the survey area is located in the southern hypocentral region of the 1983 Nihonkai–Chubu earthquake. Within the aftershock area of this earthquake, there was a  $M_{JMA}6.4$  earthquake in March 2011 following the 2011 off the Pacific Coast of Tohoku Earthquake. The western part of the survey area is the transition zone of the Yamato Basin and the Japan Basin. It is very important to study the crustal structure of the Japan Sea in seismotectonic studies of the eastern margins of the Japan Sea. 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 Akita and Yamagata.

On the way to the Japan Sea from Yokohama, ten OBSs (Ocean Bottom Seismographs) were deployed for aftershock observations around the rupture zone in the offshore area of Miyagi prefecture. The aim was to record aftershocks from the 2011 off the Pacific Coast of Tohoku Earthquake.

### **(2) List of observation instruments :**

#### **1) Multichannel seismic reflection survey (MCS):**

We conducted a MCS survey around the areas off Akita and Yamagata in the eastern margins of the Japan Sea using the R/V KAIREI. MCS data were acquired along 11 lines (EMJS1101, EMJS1102, EMJS1103, EMJS1104, EMJS1105, EMJS1106, EMJS1107, EMJS1108, EMJS1109, EMJS1110, and EMJS11B) with a total length of approximately 1,924 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 ocean bottom seismographs (OBSs):**

We deployed 55 OBSs at the EMJS1110, 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 and the SEG-Y format. 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) Deployment of OBSs off Miyagi:**

We deployed ten OBSs for aftershock observations around the rupture zone in the offshore area of Miyagi prefecture on the way to the Japan Sea. These OBSs were deployed to observe the aftershocks of the 2011 off the Pacific Coast of Tohoku Earthquake. All OBSs will be retrieved in October, during the KAIYO cruise.

#### **4) Bathymetry, magnetic, and gravity observations:**

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