

CRUISE SUMMARY

「KAIYO」(KY09-05)*Northern Japan Sea-around the Okushiri Island

1. Cruise Information

Cruise Number	KY09-05
Name of vessel	「Kaiyo」
Title of the cruise	Northern Japan Sea-around the Okushiri Island
Chief Scientist	Ryo Matsumoto Univ. of Tokyo Dept of Earth and Planetary Science
Representative of the Science Parth	Ryo Matsumoto Univ. of Tokyo Dept of Earth and Planetary Science
Title of the Proposal	Integrated survey of bio-geochemical processes of the evolution of methane hydrate and methane plumes in the eastern margin of Japan Sea
Cruise Period	July 31 - August 5, 2009
Ports of Call	Yokosuka (JAMSTEC)-Naoetsu
Research Area	West of Okushiri island, eastern margin of Japan Sea (Fig. 1)

2. Overview of the Observation

(1) Background and purpose

Methane hydrate is a solid material composed of methane and water molecules, and is expected to become new energy resource. Methane hydrate is also important as an environmental mediator which drastically modifies carbon cycle on the earth's surface. We recognized methane plumes and recovered massive methane hydrate near surface sediments off Naoetsu, Joetsu basin in 2004. Since then, we conducted a series of surveys including an ocean floor survey by ROV Hyper Dolphin, piston coring, and single channel seismic survey, and reached a hypothesis that massive accumulation of methane hydrate in Joetsu basin is closely related with the origin and evolution of Japan Sea. In 2007, we expanded survey area to the entire eastern margin of Japan Sea from Joetsu to the west of Hokkaido, and conducted SCS survey, ROV dives, and piston coring in the Shiribeshi trough and west of Okushiri island, Hokkaido, in 2008. 2008 surveys have revealed that the depth of SMI on a small ridge west

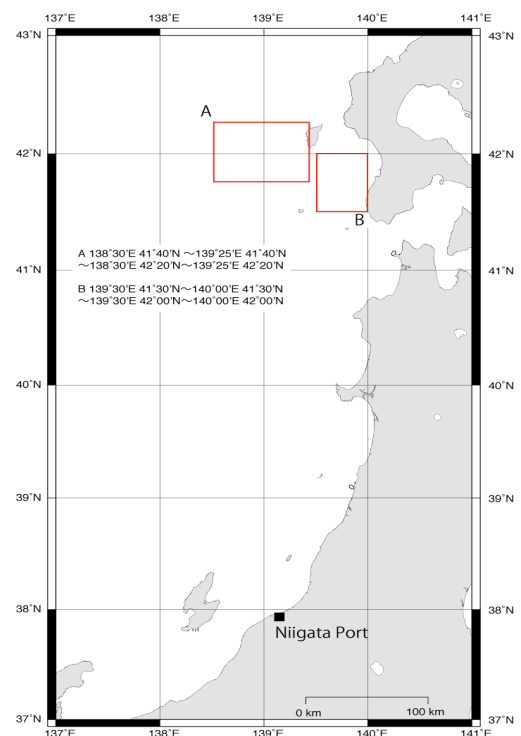


Fig. 1 Survey area, west of Hokkaido

of Okushiri island is only 1 m, which suggests extremely high flux of methane. On the other hand, there are a number of large-scale pockmark-like structures in the Okushiri basin, which are quite similar to pockmarks on the Umitaka spur of the Joetsu basin and are likely to suggest large scale methane seeps.

The objectives of the cruise KY09-05 are, (1) to determine the methane flux by taking a number of piston cores from the BSR area, (2) to identify methane induced carbonate crust and nodules, (3) to recover methane hydrate, and (4) to know if large scale depressions are methane induced pockmarks or not.

(2) Survey items

- ① 6 to 8 m long piston coring in the basin and ridges west of Okushiri (4 times)
- ② Temperature measurements by Antares thermometer (2 times)
- ③ Bottom profiles by means of SeaBeam
- ④ Single Channel Seismic survey (46 miles)

(3) Methods and Instruments

① Piston coring

Length of corer	:	6m and 8m
Top weight	:	800kg
Free fall range	:	3.5m
Inner tube	:	CV tube
Outer pipe	:	Stainless pipe

- ② Temperature measurements by means of Antares thermometers attached to the outer pipe of piston corer. Resolution is 0.001K.

- ③ Topographic survey of SCS and PC areas by means of the SeaBeam

SeaBeam survey of the B-area was cancelled as the area was totally occupied by hundreds of squid fishing boats.

- ④ SCS : Single Channel Seismic Survey

< Specification >

Active section length	:	47m
Frequency	:	flat from 10Hz to 1000Hz
Airgun	:	Bolt 2800LLX Cluster Gun
Air pressure	:	13.5 MPa
Sample rate	:	1.0 msec
Recording length	:	2400 msec

(4) Results of Research Activities

① Piston coring

Site PC919 (KY09-05 PC01) 8m-long. On the ridge
WD=3404m. Core recovery 498cm



Fig. 2 8-m long PC deployment.

Site PC920 (KY09-05 PC01) 6mlong. HF

On the ridge, WD=3413m. Core recovery 426cm

Site PC921 (KY09-05 PC01) 8mlong.

Slope on the ridge, WD=3470m. Core recovery 688cm

Site PC922 (KY09-05 PC01) 8mlong. HF.

In Okushiri basin, WD3681m. Core recovery 541cm

② Heat Flow Measurements:

Site PC920 (Summit of the ridge) (Quick tentative value =115K/1km)

Site PC922 (Basin floor)(Quick tentative value =128K/1km)

③ Topographic survey (Fig. 3)

④ SCS (Fig. 3)

40 miles survey. We got marvelous results thanks to a very quite sea conditions as well as a wonderful operation of ship crew and science support team. Strong and continuous BSRs have been recognized over the ridge. Gas charged zone seems to occur in sediments above BSRs.

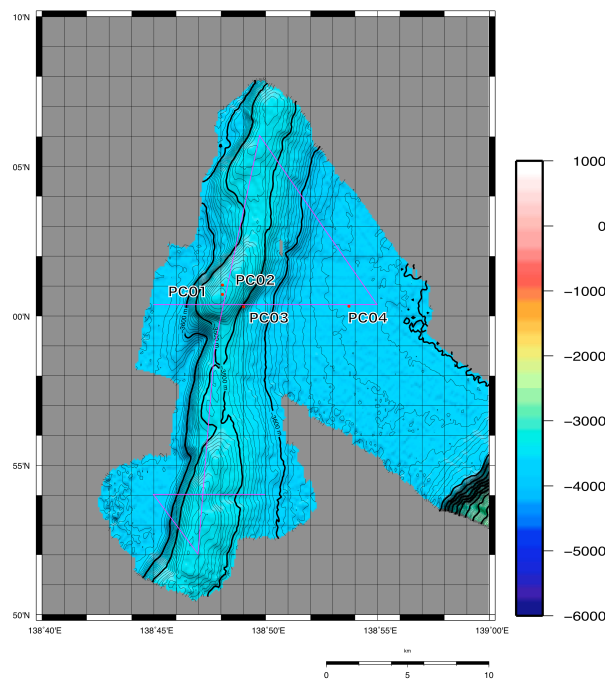


Figure 3 Results of the topographic survey and SCS.