

# NATSUSHIMA Cruise Summary

NT08-09 LEG1,2

Eastern margin of Japan Sea

April 29<sup>th</sup>, 2008 – May 21<sup>st</sup>, 2008

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

## Cruise Information

Cruise number: NT08-09 LEG1,2

Ship name: R/V *Natsushima*, ROV *Hyper-Dolphin*

Title of the cruise:

Integrated study on biogeoscience of methane hydrate and methane plume in the eastern margin of Japan Sea

Chief Scientist: Ryo Matsumoto (Earth and Planetary Science, University of Tokyo)

Representative of Science Party:

Ryo Matsumoto (Earth and Planetary Science, university of Tokyo)

Cruise period: April 29<sup>th</sup>, 2008 – May 21<sup>st</sup>, 2008

Port call:	April 29 <sup>th</sup>	Departure	JAMSTEC, Yokosuka, Kanagawa
	May 10 <sup>th</sup> – 12 <sup>th</sup>	Port call	Naoetsu, Niigata
	May 21 <sup>st</sup>	Arrival	JAMSTEC, Yokosuka, Kanagawa

Research area: Eastern margin of Japan Sea

Sado Ridge-Joetsu Knoll-offshore Okushiri Island-Shiribeshi Trough

## Overview of Observation

### *Objectives*

Although marine gas hydrates have a close relation to our life in terms of gas resource, global environment, and potential disaster, their distribution and behavior are still a matter of debate. The goal of our research is to understand geological factors and processes controlling the distribution and behavior of marine gas hydrate system. The Japan Sea is a semi-isolated marginal basin which is surrounded by the Japanese Island Arc and the Asian main land, strong emission of methane from the seafloor into the overlying seawater may cause a large impact to marine environments. On the other hand, observations of active methane emissions point to higher gas resource potential along the eastern margin of Japan Sea. This study focuses on geophysical and submersible investigations in the Joetsu Knoll, Sado Ridge, and Okushiri Island-Shiribeshi Trough regions, and integration of geological, geochemical, and biological features among these sites to assess the total resource potential and methane activities in this region.

### *Observations & Activities*

ROV *Hyper-Dolphin* dive surveys were conducted in the following regions;

(1) Joetsu Knoll region

(1)-1: Umitaka Spur area (water depth; 850-1000 m)

37°24.0'N – 137°59.5'E – 37°28.0'N – 138°02.0'E

(1)-2: Joetsu Knoll region (water depth: 900-1200 m)

37°31.0'N – 137°54.0'E – 37°38.0'N – 138°02.0'E

(2) Sado Ridge region

No dive researches

(3) Okushiri Island-Shiribeshi Trough region

(3)-1: South to Okushiri Island (water depth; 100-2800 m)

41°40.0'N – 139°10.0'E – 42°10.0'N – 139°10.0'E – 42°10.0'N – 139°23.0'E  
– 42°02.0'N – 139°23.0'E – 42°02.0'N – 139°33.0'E – 42°10.0'N –  
139°33.0'E – 42°10.0'N – 139°45.0'E – 41°40.0'N – 139°45.0'E

(3)-2: South Shiribeshi Trough (water depth; 1000-3000 m)

42°30.0'N – 139°10.0'E – 43°00.0'N – 139°10.0'E – 43°00.0'N – 140°00.0'E  
– 42°30.0'N – 139°45.0'E

(3)-3: North-West Shiribeshi Trough (water depth; 500-3000 m)

43°00.0'N – 139°10.0'E – 43°30.0'N – 139°30.0'E – 43°30.0'N – 139°50.0'E  
– 43°00.0'N – 139°30.0'E

Single Channel Seismic (SCS) and SEABAT surveys were conducted by R/V *Natsushima* in the following regions;

(3) Joetsu Knoll region

(1)-1: Umitaka Spur area (water depth; 260-2200 m)

37°10.0'N – 137°45.0'E – 37°45.0'N – 137°45.0'E – 37°45.0'N – 138°15.0'E  
– 37°22.5'N – 138°15.0'E – 37°10.0'N – 138°00.0'E

(1)-2: Joetsu Knoll region (water depth: 50-1100 m)

37°31.0'N – 137°54.0'E – 37°38.0'N – 138°02.0'E

(4) Sado Ridge region

37°45.0'N – 137°45.0'E – 39°50.0'N – 138°20.0'E – 39°50.0'N – 139°20.0'E  
– 38°40.0'N – 139°20.0'E – 38°25.0'N – 139°00.0'E – 38°25.0'N –  
138°20.0'E – 37°45.0'N – 138°05.0'E

(3) Okushiri Island-Shiribeshi Trough region (water depth; 100-3300 m)

41°20.0'N – 139°10.0'E – 43°40.0'N – 139°10.0'E – 43°40.0'N – 140°00.0'E  
– 43°00.0'N – 140°00.0'E – 42°20.0'N – 139°40.0'E – 42°00.0'N –  
140°00.0'E – 41°50.0'N – 140°00.0'E – 41°20.0'N – 139°50.0'E

*Method*

ROV *Hyper-Dolphin*

- 1) Observation of seafloor morphology, methane plume, and benthic organisms with submarine video camera and monitor.
- 2) Experiments of gas hydrate dissociation/formation with double-evacuated syringe fluid sampler.
- 3) Sampling of methane hydrates and host sediments with rotary corer.
- 4) Long-term observation of methane plume with video monitor.
- 5) Fluid sampling with vacuum sampler and NISKIN sampler.
- 6) CTD measurements
- 7) Experiment of methane plume quantification with quantitative echo

sounder.

- 8) Sediment sampling with push corer (MBARI, MBARI-long sampler).
- 9) Heat flow measurement with SAHF.
- 10) Seafloor survey with DAI-PACK
- 11)  $\gamma$ -ray measurement
- 12) Benthic organism sampling with slurp gun, rake, and basket (dredge).

*R/V Natsushima*

- 1) Observation of seafloor morphology and methane plume distribution with SEABAT and quantitative echo sounder during transition or night time.
- 2) Determination of methane plume location with SEABAT during ROV operation to conduct the ROV precisely.
- 3) Acquisition of sub-seafloor profile with SCS survey.