

NATSUSHIMA Cruise Summary
NT09-11

Hatoma Knoll
(as a substitute area for Iheya North)

July 27 (Naha) – August 4 (Yokosuka), 2009

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

1. Cruise Information

1.1. Cruise number:

NT09-11

1.2. Name of vessel:

R/V Natsushima

ROV Hyper-Dolphin

1.3. Title of the cruise:

‘Hyper-Dolphin’ deep-sea dive research

1.4. Chief scientist:

Masahiro Yamamoto [JAMSTEC]

1.5. Representatives of the science party:

Masahiro Yamamoto [JAMSTEC]

Hisako Hirayama [JAMSTEC]

1.6. Titles of proposals:

- In-situ electrochemical analysis of sulfur compounds in deep-sea hydrothermal field

- Ecological study of primary producers utilizing methane in the deep-sea: “How much do Bathymodiolus mussels eat?”

1.7. Cruise period:

July 27 - August 4, 2009

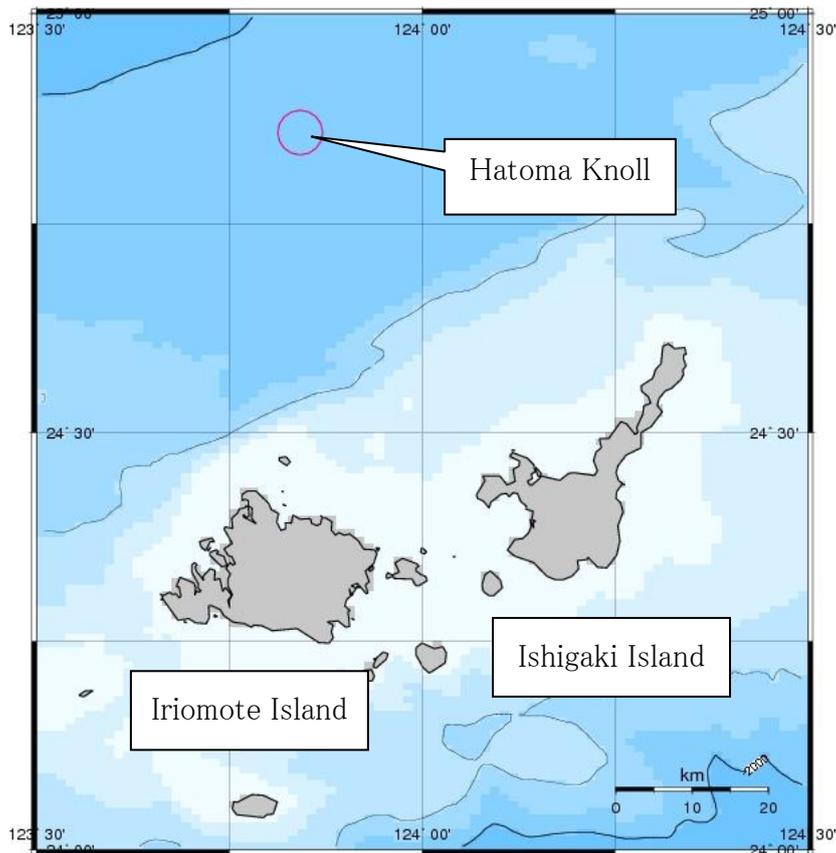
1.8. Ports of call:

Naha (daparture) – Yokosuka (arrival)

1.9. Research area:

Hatoma Knoll within a radius of 1.5 miles at $24^{\circ}51.5'N$
 $123^{\circ}50.5'E$

1.10. Research Map:



2. Overview of the Observation

2.1. Overview of the Observation

We had two major objectives shown in titles of proposals, 1) In-situ electrochemical analysis of sulfur compounds in deep-sea hydrothermal field, 2) Ecological study of primary producers utilizing methane in the deep-sea: “How much do *Bathymodiolus* mussels eat? ”. Both objectives were contained in a magnificent purpose, ‘to elucidate flux of materials and energy in deep-sea hydrothermal fields’. For the attainment of our goal, we had studied on composition of hydrothermal fluids, inhabiting microorganisms, functional genes and metabolic pathways, interaction between the environmental chemical features and the ecosystems, and so on. In this cruise, we especially focused on the concentration of sulfide, and the consumption of methane by *Bathymodiolus* mussels. To measure concentration of sulfide, we developed an electrochemical analyzing system. This system was examined in this cruise for the first time. We aimed for the real-time and pinpoint observation of sulfide. To research the methane-eating mussels, we collected *Bathymodiolus* mussels living in the hydrothermal field by using a slurp gun. We extracted fresh gill tissues from the mussels, and prepared a series of experimental mixture to measure methane consumption rates at the shore laboratory. Moreover, we collected several samples of fluids, plumes, rocks, and animals from the deep-sea hydrothermal field. We will investigate various factors in the ecosystem by chemical and biological methods to reinforce our previous results and understanding. At first of the cruise, we were planning to carry out these projects at the Iheya North hydrothermal field. However, several bad conditions, such as a tropical low pressure, a rapid tidal current, and a conflict with fishing, prevented us from staying at the Iheya North field. Therefore, we accomplished above projects at the Hatoma Knoll, where we had previously designated as the substitute area for the Iheya North.