

## Cruise Summary (NT15-02)

### 1. Cruise Information

- Cruise ID: NT15-02
- Name of vessel: R/V Natsushima
- Title of the cruise: Research of the hydrothermal fields in the Middle Okinawa Trough (proof of spontaneous electricity generation around hydrothermal vents, understanding of hydrothermal fluid cycle structure, establishment of hydrothermal fluid, next-generation technology development for seafloor resource survey)
- Chief scientist [Affiliation]: Masahiro Yamamoto [JAMSTEC] (Leg 1), Takafumi Kasaya [JAMSTEC] (Leg 2)
- Representative of the Science Party [Affiliation]: Masahiro Yamamoto [JAMSTEC] (Subject 1), Takafumi Kasaya [JAMSTEC] (Subject 2), Kentaro Nakamura [The University of Tokyo] (Subject 3)
- Cruise period: (Leg1) January 11, 2015 - January 14, 2015  
(Leg2) January 14, 2015 - January 27, 2015
- Ports of departure / call / arrival: Naha / Naha / Naha
- Research area: Middle Okinawa Trough (Fig.1, 2)

## **2. Overview of the Observation**

- Overview of the observation

### 1<sup>st</sup> Subject

Purposes and Methods: We tried to show the evidence that electricity is spontaneously generated via deep-sea hydrothermal vent, and the influence of the electricity on the ecosystem and environment.

Results: We installed the hydrothermal fluid fuel cell system onto the artificial deep-sea hydrothermal vent, monitored the power generation, and carried out electrical cultivation of microorganisms. In addition, in-situ measurement of redox potential and specific resistance on/in the seafloor around natural hydrothermal vents. Deep-sea samples of animals and rocks were collected to analyze the electrical properties and influences.

### 2<sup>nd</sup> Subject

Purposes and Methods: To establish the survey method for the hydrothermal deposit, we plan the DC resistivity survey around the North Iheya field. We set up the small mobile electro-magnetometer, and send the electric signal from the controlled source unit on the HPD.

Results: We first recovered a long-term electrometer with a 5ch underground thermometer in the HPD 1772. We successfully carry out the DC resistivity survey using HPD at the Natsu site and Aki site in the North Iheya field. The electric field data were recorded on the data logger on the mobile OBEs. We were also able to recover all pop-up type OBEMs around the Iheya north knoll area.

### 3<sup>rd</sup> Subject

Purposes and Methods: Our purposes in NT15-02 cruise is to conduct HPD dives (1) to confirm hydrothermal activities at the sites where plumes were detected by acoustic system equipped on R/V Yokosuka during YK14-17 cruise, and (2) to sample hydrothermal fluids, chimney structures and vent-endemic faunas which were used for characterizing the newly discovered hydrothermal sites in Mid-Okinawa Trough.

Results: We conducted 3 HPD dives and confirmed the hydrothermal activities at 2 site, Hitoshi site and Noho site. We have suggested that the noho site is largest hydrothermal site in the Mid-Okinawa trough in terms of both temperature of hydrothermal fluids and scale. And also we sampled various hydrothermal fluids, chimney structures and vent-endemic faunas. These samples will use for characterize Noho site to comparing other hydrothermal sites in Mid-Okinawa Trough.

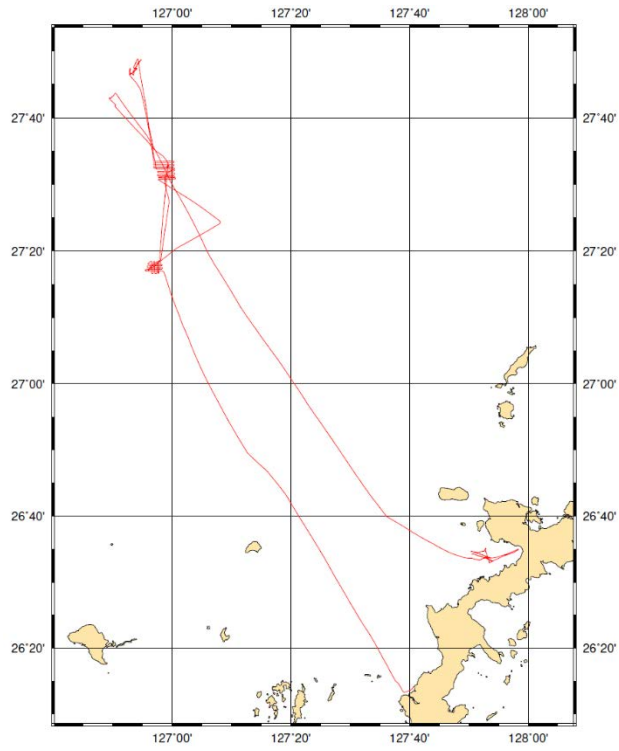


Fig.1 Ship track of NT15-02 leg1.

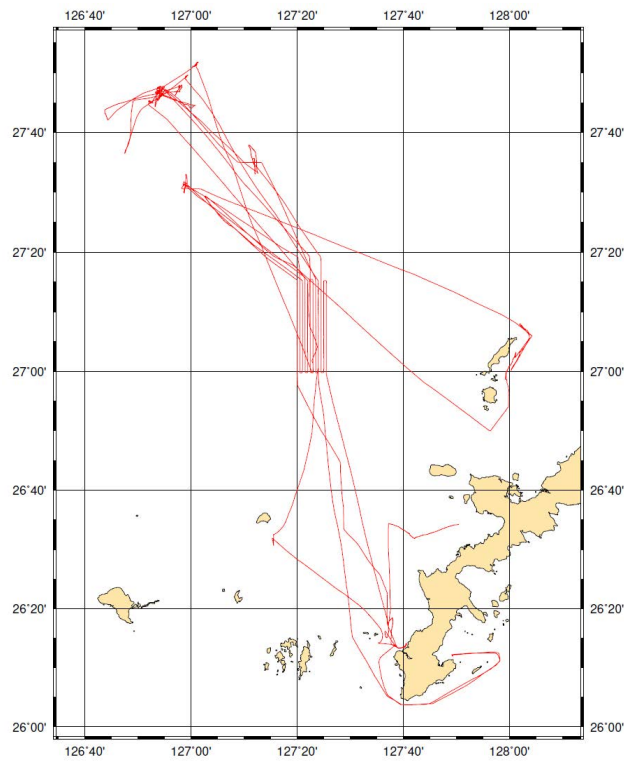


Fig.2 Ship track of NT15-02 leg2.