Submission date 2014/4/20

Cruise Summary

1. Cruise Information

● Cruise ID: NT14-06

● Name of vessel: Natsushima

● Title of the cruise: Natsushima/Hyper-Dolphin NT14-06

● Chief scientist [Affiliation]: Motohiro SHIMANAGA [Kumamoto University]

● Representative of the Science Party [Affiliation]:

Motohiro SHIMANAGA [Kumamoto University]: "The final piece for the study on the hypothesis of the passive meiofaunal migration between hydrothermal vents in "neighbor" seamounts: Research on the Bayonnaise Knoll caldera"

Koji INOUE [University of Tokyo]: "Elucidation of the hypotaurine-synthesis pathway of deep-sea mussels"

Satoshi MITSUNOBU [University of Shizuoka]: "Time-resolved in situ colonization experiments of basalt at seafloor to understand a deep biosphere ecosystem"

● Cruise period: 11th April - 20th April, 2014

● Ports of call: Yokosuka port / Shimizu port

● Research area: Around Izu-Ogasawara arc

2. Overview of the Observation

● Overview of the observation

In this cruise, we visited active hydrothermal venting sites in the Bayonnaise and Myojin Knolls. Eight dives (Dive #1645-1652) were done, during six research days in total. Three research groups participated to this cruise. The purposes of those groups were shown below.

[Shimanaga group]

Our major purpose is to investigate spatial differences in meiofaunal community structure among hydrothermal vents in seamounts on the Izu-Ogasawara Arc, evaluating similarities in species diversity and community structure between meiofauna assemblages around hydrothermal vests in different calderas belonging to the same arc. During the cruise (ROV/hyper-Dolphin, Dives #1647, #1648, 1649, 1652), we collected meiofauna in the sediment and on bacteria matts on the walls of vents, using different types of corers and suction samplers. We will sort those collected meiofauna based on morphological structures and DNA sequences. We hope that data obtained through our studies will bring us important information on common and specific features of the meiofaunal

community around hydrothermal vent ecosystems.

[Inoue group]

The purpose of the Inoue group is to elucidate the accumulation mechanisms of hypotaurine, an amino acid used to avoid the toxicity of hydrogen sulfide in the hydrothermal-vent water. In this cruise, we collected the deep-sea mussel *Bathymodiolus septemdierum* at Myojin Knoll. A part of the collected mussels are used for physiological and biochemical experiments on board and others are kept in aquaria for the experiments after cruise. In addition, temperature and sulfide level of the sampling points were measured using sensors to understand the influence of environmental conditions to the expression of the hypotaurine accumulation mechanisms.

[Mitsunobu group]

Our main objective is to understand a litho-biosphere ecosystem beneath sea-floor supported by oxidation of ferrous iron (Fe(II)) in ocean crust, basalt. Accordingly, we would perform "time-resolved *in situ* colonization experiment with fresh basalt" and investigate biotic alteration process of the basalt rock and microbial community related to the alteration, in the view of Fe(II) oxidation reaction. In this cruise, (i) we have installed three incubation vessels in both hydrothermal and non-hydrothermal areas in Beyonnaise knoll, and (ii) have collected seawater and rock samples on the setting points. As the future works, we will analyze the collected seawater and rock samples, which shows us the environmental condition and thermodynamically possible reaction at the installation points. The installed incubation vessels will be recovered first in December 2014, which is the second cruise for our project.