

## Cruise Summary

### 1. Cruise Information

- Cruise ID: NT12-08
- Name of vessel: Natsushima
- Chief scientist [Affiliation]: Toshiro Yamanaka [Okayama University]
- Representative of the Science Party [Affiliation] : Toshiro Yamanaka [Okayama University], Toshihiro Maki [University of Tokyo]
- Title of proposal
  - #1. Study of Geochemical constraints on the stibnite ore formation with gold deposit
  - #2. Imaging of Tagiri hydrothermal vent field by an autonomous platform system
- Cruise period: April 2<sup>nd</sup>, 2012 to April 9<sup>th</sup>, 2012
- Ports of call: Kagoshima – Kagoshima
- Research area: Wakamiko crater, Kagoshima Bay

### 2. Overview of the Observation

- Overview of the observation

#### Proposal #1

The main purpose of Proposal #1 is determination of precipitation condition for hydrothermal minerals from hydrothermal fluids, which emitted from adjacent three vents in the Wakamiko crater hydrothermal field. From the previous study, we found those three vents discharging hydrothermal fluids, which have similar major chemical composition but characterized by various temperature and minor chemical compositions. Such characteristics are expected to understand of geochemical constraints on precipitation condition of hydrothermal minerals below the seafloor. During this cruise we planed to collect sufficient amount of hydrothermal fluids for geochemical analyses of minor elements and dissolved gas species from those three vents.

As a result we sampled successfully enough amount of hydrothermal fluids ( $\geq 2$  L) and hydrothermal precipitation from two vents and one shimmering site during four dives.

#### Proposal #2

##### 1. Seafloor mapping by an autonomous system

We are developing an autonomous platform system consisting of a seafloor station and a hovering-capable autonomous underwater vehicle (AUV) in order to visualize hydrothermal

vent fields. During this cruise, the prototype system consisting of AUV Tri-TON and the station was deployed on the seafloor with the depth of 200 m, near the chimneys in Wakamiko Crater. The experiments were carried out on 4, 6, and 8 April. The vehicle succeeded in finding the seafloor station by acoustic communication and then observed seafloor by following waypoints defined with regard to the station. Thus, the performance of the system was verified.

## 2. Study on the potential of hydrothermal vents as power sources

Hot fluid coming out from hydrothermal vents has a potential as power sources, as there is a significant temperature difference between the hot fluid and surrounding water. During this cruise, the energy potential of the White Cone chimney in Wakamiko hydrothermal field was evaluated by measuring the flow velocity and temperature. A testing model of a power generator made with Peltier devices was also deployed to the vent, for feasibility study.