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## Cruise Summary

### 1. Cruise Information

- Cruise ID: NT11-10 (Leg2)
- Name of vessel: Natsushima
- Title of the cruise: Research cruise Hyper-Dolphin 3000 Ogasawara Plateau
- Chief scientist: Prof. Akira Usui [Faculty of Science, Kochi University] :
- Representative of the Science Party: Prof. Akira Usui [Faculty of Science, Kochi University] :
- Cruise period: July 3- July 7, 2011
- Ports of call (Leave/Arrival : Futami Harbour, Ogasawara Is./JAMSTEC port, Yokosuka
- Research area: Minami Seamount, Ogasawara Plateau area

### 2. Overview of the Observation

The Northwestern Pacific seamounts are believed as potential areas for ferromanganese crusts as future rare metal resources. The reality in geological occurrence, compositional variations are not well yet understood as well as controlling factors for growth and concentration processes. Our team, composed of geologists, mineralogists, geochemists, physical engineers, and microbiologists have planned to collect and study in the two typical environments in the Pacific seamounts and marginal seamounts. We attempt to collect ferromanganese crusts samples from an isolated flat-topped guyot in the NW Pacific basin, and the Minami seamount (This study). We plan to propose a cruise of Mn crust study next year.

We carried out a NATSUSHIMA-Hyper Dolphin 3000 exploration and successfully mapped the occurrence of the ferromanganese deposits, again using the powerful and skillful ROV Hyper Dolphin 3K. The ROV mapping and sampling proved to be useful and efficient for exploration of ferromanganese crusts in the last cruise at Takuyo-Daigo seamount. We expect to understand the depositional environments and processes, behavior of metal elements.

In advance for the dive, over the slope between water depths from 2000 to 1350 meters, we conducted a multi-narrow beam bathymetric study. During the dive along a total 1.5-km track within water depths between 1800 to 1350 meters on the eastern slope of the seamount, total 14 ferromanganese samples (254 kg in wet total) was taken at 13 stops. The thickness of ferromanganese crusts ranges from less than 1 mm to 105 mm in maximum, whereas 11 samples were apparent crusts with over 5cm thick cover of ferromanganese oxide. Most of them show separated nature from the original substrate rocks but transported from shallower sea floors. This unique occurrences of substrate rocks covered with relatively thin ferromanganese oxide were similar to those in the Takuyo-Daigo seamount where consolidated

lagoon sediments with milky carbonate matrix.

The undisturbed and uncontaminated ferromanganese deposits or sediments were most suitable for the following analysis in collaboration of participants and co-workers, i.e., geological and geological and oceanography study. We started analysis in mineralogy, geochemistry, isotopes, trace and rare metal elements in the crusts to understand the modes of cycling and concentration of metal elements in space and time.