

Cruise Information

- ◎ Cruise number: NT09-10 Leg2
- ◎ Ship name: Natsushima, Hyper-Dorpin
- Title of the cruise: ROV Hyper Dolphin research dive, deep sea research, FY2009
- Chief Scientist Toshiro Yamanaka
[Graduate school of Natural science and Technology, Okayama University]
- Representative of Science Party
Toshiro Yamanaka [Okayama University]
Geochemical and geocmicrobiological investigation for unexplored hydrothermal fields in the Southern Okinawa Trough
- Cruise period: July 19, 2009, July 25, 2009
- Port call: Naha
- Research Area: Tarama Seamount, the Nansei Islands (Fig.1)

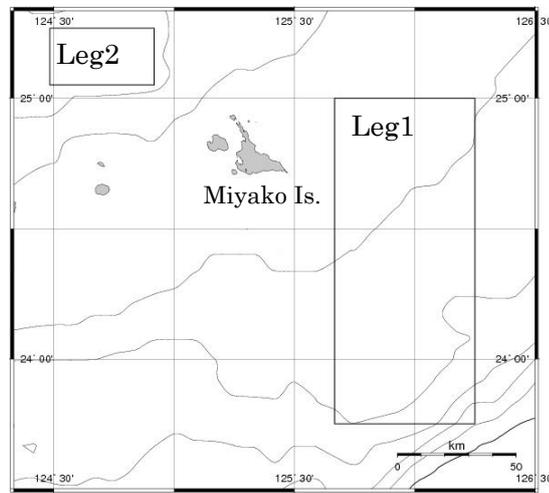


Fig.1 Research area

Leg2 Irabu Ensuidai seamount & Karudera seamount (Depth: 1,300 ~ 2,100m)
and Tarama seamount (Depth: 1,600 ~ 1,900m)
The area surrounded with the following lines of longitudes and latitudes,
25°03.0'N, 124°29.0'E
25°16.0'N, 124°55.0'E

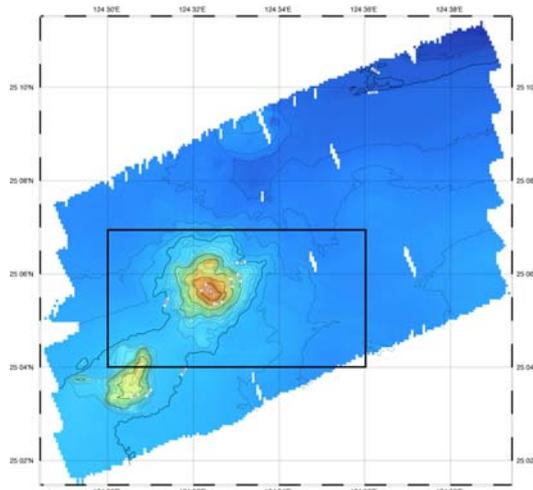


Fig. 2 Bathymetry of Tarama seamount and dive study area (in black quadrilateral)

● Overview of Observation

Purpose and Background:

For understanding of whole Okinawa Trough as a single system, it is necessary to research of a blank area of possible hydrothermal activity. It is expected to strongly improve the knowledge how geology and tectonics control chemistry of the hydrothermal fluids and distribution of the related (micro-) organisms in the Okinawa Trough. To reach the goal our targets of this cruise are focused on the Irabu ensuidai and Karudera seamounts and the Tarama seamount, which are located southeastern part of western edge of the Okinawa Trough. In 2000 hydrothermal activity has been observed during Shinkai 6500 dive study on the Irabu ensuidai and Karudera seamounts, however, any geochemical and biological observation have not been done yet. On the other hand, significant turbidity and methane-concentration anomaly possibly originated in hydrothermal activity has been found on the summit of Tarama seamount during the KT05-26 cruise in 2005 by surface ship study. It is likely to easily identify the venting sites from those seamounts. After the identifying the venting sites we plan to conduct the geological, geochemical and (micro-) biological sampling and clarify the nature. Then we compare the nature with the known hydrothermal sites in the Okinawa Trough for further understanding of the linkage between the chemical and biological nature and the geological and tectonic background.

Methods and Instruments:

For accomplish the purpose, we sampled seawater (Niskin bottle, bag pump sampler and WHATS with temperature probe), sediments (push corer), rocks and organisms (sponge, fish, etc. with suction sampler). In addition, during each dive the transmissivity of water had been measured.

Research results:

We lost first two days due to Typhoon attack, therefore our survey was focused only on the Tarama seamount. During three dives, we could not identified any active venting site, but we found some red-brown areas on seafloor at around 1550 m in depth on the south slope, and we observed temperature anomaly at the red-brown area, where the surface sediment temperature was about 7°C higher than that of the ambient bottom water. It may suggest that the gentle shimmering of hydrothermal fluids at the red-brown area. In addition, the bathymetry study prior to the dives of the ROV show that the actual Tarama seamount is much smaller than that of the bathymetry obtained from the previous data, and the true Tarama seamount has two peaks and is characterized by steep slopes. The rock samples obtained from the slopes were only pumice, implying that the seamount is a kind of pyroclastic cone and steep slope should be due to collapse of a part of the cone body.

From the interstitial water and its dissolved gas chemistries in the red-brown sediment sample we plan to decide whether the temperature anomaly is caused by a hydrothermal activity. In addition, from the isotopic signatures of the benthos samples we try to estimate whether they rely on the chemosynthesis-based primary production.