

Cruise Report
(NT10-17, R/V Natsushima)

Izena Cauldron, Iheya North, and Iheya CLAM hydrothermal sites

13/SEP/2010 (Naha) – 23/SEP/2010 (Naha) – 29/SEP/2010 (JAMSTEC)

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

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1. Cruise Information

1.1. Cruise ID: NT10-17

1.2. Name of vessel: Natsushima

1.3. Title of the cruise: Izena and Iheya Expedition

1.4. Title of the proposal:

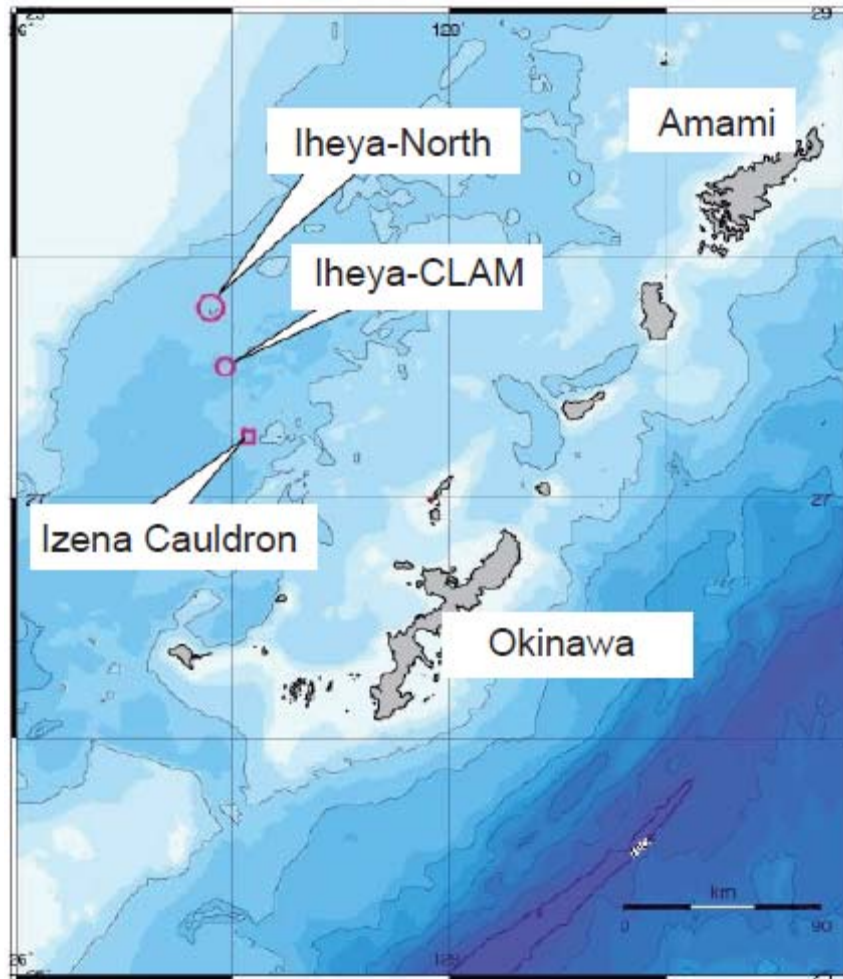
Liquid CO₂ venting: The Elemental Sulfur Cap Hypothesis to reveal a reason of the curious phenomena at the Izena Cauldron hydrothermal field

Hydrothermal vent activity inferred from shell growth of bivalves

1.5. Cruise period and Ports of call:

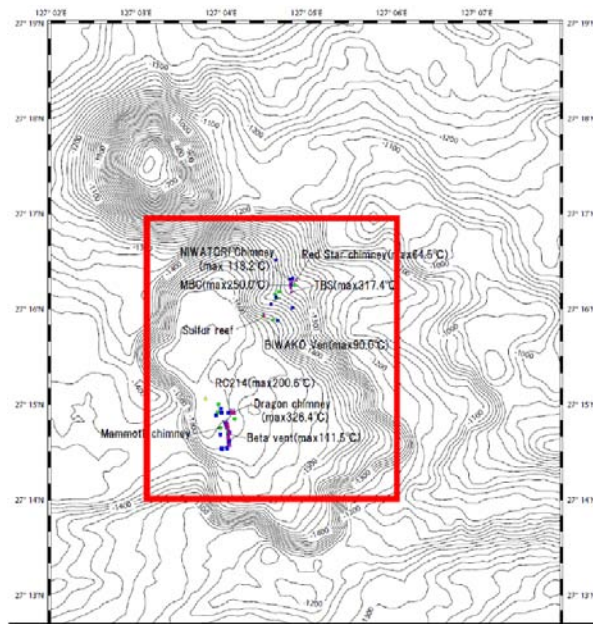
13/SEP/2010 (Naha) – 23/SEP/2010 (Naha)

1.6. Research area:

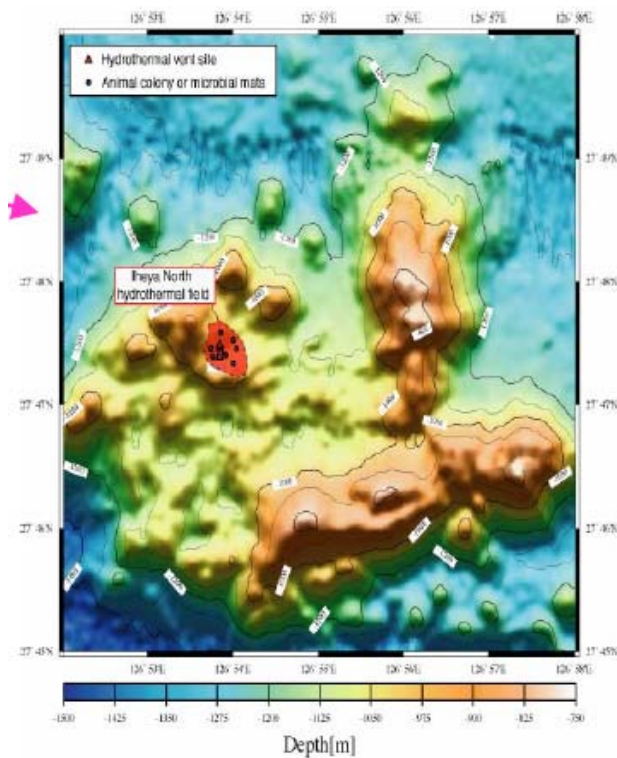


Izena Cauldron, surrounded with the lines of $27^{\circ} 14.0'N=127^{\circ} 03.0'E$ and $27^{\circ} 17.0'N=127^{\circ} 06.0'E$
Iheya North field, within 2 miles from $27^{\circ}47.5'N=126^{\circ} 54.0'E$
Iheya CLAM site, within 2 miles from $27^{\circ}33.0'N=126^{\circ} 58.0'E$

1.7. Research Map:



A bathymetry map of Izena Cauldron site



A bathymetry map of Iheya North site

Please see Appendix for further information about research fields

2. Researchers

2.1. Chief scientist [Affiliation]

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3. Observation

Izena investigation

While liquid CO₂ venting from the seafloor at the Izena Cauldron was identified in 1989 by the DSV Shinkai2000 (Sakai et al., 1990, science), it has been still not understood how liquid CO₂ pool in the subseafloor was established. We hypothesized that elemental sulfur, which is exposed at around the vent of liquid CO₂ and can be produced by cooling of vapor components resulted from subseafloor boiling of hydrothermal fluid, works as the subseafloor cap of liquid CO₂ pool. To testify this "Elemental Sulfur CAP process" hypothesis (ESCAPE hypothesis), we in this cruise investigated the Izena Cauldron hydrothermal systems using the water sampler WHATS, MBARI corers, cutter, and Niskin sampler respectively to take venting fluid, sediment, sulfur crust around the liquid CO₂ venting site, and ambient seawater by ROV HyperDolphin.

Iheya-North investigation

The D/V Chikyu established the casing pipe for a drilled hole at the Iheya North hydrothermal field during the "Deep Hot Biosphere" expedition (IODP 331) to investigate geochemical processes and microbial activities in the hidden subseafloor environment. We in this cruise approached the casing pipe by ROV HyperDolphin and carried out sampling using a "KANDATA" system, which was developed to take deep water sample (and cultivate subseafloor microbes) without any contamination from the surface world.

Iheya CLAM investigation

Physiological property of deep-sea bivalves has been still poorly known due partly to the difficulty on breeding at onshore laboratory. We in this cruise carried out "chemical marking" into their shells by adding special solution on the seafloor. This in-situ experiment enables us to estimate their shell growth rate independent from onshore breeding.

4. Research results

Dives

Iheya CLAM site: HPD 1183

Izena JADE site: HPD 1184-1186, 1188, 1192 and 1193

Izena HAKUREI site: HPD 1187 and 1191

Iheya North site: HPD 1189 and 1190

5. Acknowledgment

We are grateful to all crew and captain Tanaka of the R/V Natsushima for their safe navigation and skillful handling of the vessel. Great thanks are due to the commander Mr. Oono and the ROV HyperDolphin operation team for the sampling and observation of deep-sea hydrothermal fields in the Okinawa Trough with safe and accurate operation. We also thank Mr. Takaesu (NME) for his heartfelt support to our works. We thank all the JAMSTEC personnel who have strongly supported this cruise. Finally, to other s who were directly or indirectly involved in helping make this cruise so successful, we extend our wholehearted thanks with all the best regards and wishes.

Notice on Using

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