Press Releases

November 11, 2016
JAMSTEC

Chikyu Okinawa Drilling Expedition "Hydrothermal Sediments in Okinawa Trough III"

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC: Asahiko Taira, President) will carry out the following scientific drilling expedition "*Chikyu* Okinawa Drilling Expedition: Hydrothermal Sediments in Okinawa Trough III." This forms part of the "Scientific Research on Genesis of Marine Resources" for "Next-generation Technology for Ocean Resources Exploration" initiative, part of the "Cross-ministerial Strategic Innovation Promotion Program (SIP)."[*1]

1. Schedule & Area
Period:
November 16th, 2016: Departure from New Kochi Port, Kochi Prefecture
December 15th, 2016: Disembark at Shimizu Port, Shizuoka Prefecture (total of 30 days). The schedule is subject to change depending on weather conditions and research progress.
Drilling area: Izena Hole, Okinawa Trough (Figure 1)

2. Expedition team
Co-chief scientists:
Hidenori Kumagai: Project Team Unit for Development of New-generation Research Protocol for Submarine Resources, JAMSTEC
Tatsuo Nozaki: Project Team Unit for Development of New-generation Research Protocol for Submarine Resources, JAMSTEC
Jun-ichiro Ishibashi: Associate Professor, Faculty of Science, Kyushu University

Other members include scientists from the Institute of Advanced Industrial Science and Technology, the National Institute for Environmental Studies, Kyushu University's research team, and the Project Team for Development of New-generation Research Protocol for Submarine Resources from the Research and Development (R & D) Centre for Submarine Resources at JAMSTEC.

3. Expedition Overview
During previous *Chikyu* expeditions in the Okinawa Trough, physical parameters were determined through rock core samples obtained to ascertain lithofacies, constituent minerals, chemical composition, and physical characteristics, also via logging-while-drilling (LWD). There was also progress made on building a genesis model of seafloor hydrothermal deposits by combining this information with the distribution of subseafloor resistivity, based on electronic and electromagnetic exploration.

There is, therefore, already existing information for this survey expedition, which will drill at the Izena Hole in the Okinawa Trough, a field site suitable for establishment of exploration protocols for subseafloor hydrothermal deposits.[*2] This expedition also aims to continue building a genesis model of subseafloor hydrothermal deposits and to establish exploratory methods by comparing the core samples and physical parameters acquired during this expedition with electronic and electromagnetic exploration survey results.

Furthermore, as active hydrothermal vents were artificially formed after drilling at the Noho Site south of the Iheya Minor Ridge during a previous expedition (Hydrothermal Sediments in Okinawa Trough II, previous report on March 18th, 2016), the operations will also include instalment of monitoring equipment at the drill hole for long-term measurement of the ore precipitation process and of fundamental parameters of hydrothermal activity.

4. Research Background and Purpose

Within Japanese coastal waters, the Okinawa Trough and Izu-Ogasawara Arc are known to be the areas where large-scale hydrothermal deposits are most likely to exist. There may be subseafloor hydrothermal deposits in these locations. However, in the absence of well-established exploration technologies, details of the distribution of subseafloor hydrothermal deposits are not known. Also, even if the targeted areas are limited to the Okinawa Trough and/or Izu-Ogasawara Arc, this area of ocean is so vast that it is necessary to identify features to be observed so as to narrow the focus areas and clarify the genesis of such deposits, and thus to help formulate more efficient exploration protocols.

Among these activities, and as noted above, there has been progress in the construction of a genesis model that will be able to systemically explain the formation mechanism of seafloor mineral resources, as well as in the development of effective exploration methods for seafloor resource surveys. This progress has been possible through the Cross-ministerial Strategic Innovation Promotion Program (SIP) Next-generation Technology for Ocean Resources Exploration, implemented from FY2014, with the aim of developing methods for marine resource surveys that can be utilized by private companies.

In the SIP Next-generation Technology for Ocean Resources Exploration, surveys have been focused on hydrothermal activity around the Okinawa Trough, with scientific drilling surveys conducted by the drilling vessel *Chikyu*. The results of these surveys suggest the possibility that subseafloor hydrothermal reservoirs may be forming over a vast area, with numerous hydrothermal vents in the same location (previous reports dated March 4th 2014, July 26th 2014, and March 18th 2016). Subsequent research has suggested progression in the formation of subseafloor hydrothermal reservoirs and ore bodies in the surrounding area.

In this survey, we will compare and verify previous geophysical exploration results from the Izena Hole through *Chikyu* scientific drilling, with the aim of building the above-mentioned genesis model, which is currently being constructed based on these findings.

We also anticipate that the results of this expedition will contribute to elaboration of exploration methods and information on the types of sensors required for efficient survey of subseafloor hydrothermal deposits.

*1 Cross-ministerial Strategic Innovation Promotion Program (SIP)
In 2014, the Cross-ministerial Strategic Innovation Promotion Program (SIP) was established with a 5-year plan as a national project for science, technology, and innovation, spearheaded by the Council for Science, Technology and Innovation

(CSTI). The latter exercises its headquarters function to accomplish its role in leading science, technology, and innovation beyond the framework of government ministries and traditional disciplines. A total of 11 issues were identified by the CSTI. JAMSTEC is responsible for "Next-generation Technology for Ocean Resources Exploration (Zipangu in the Ocean: Tetsuro Urabe, who is acting as Program Director, is Professor Emeritus at the Graduate School of Science, University of Tokyo/Advisor at the Japan Mining Engineering & Training Centre). Through its long-term monitoring technologies, this is responsible for carrying out scientific research on ocean resource genesis, development of ocean resource exploration technology, and ecosystem research. The plan thus far is that these technologies will be directly applicable to private sectors.

*2 Subseafloor hydrothermal deposits

Currently unexposed mineral deposits on the sea floor that have been covered in sediment after thermal activity ceased.

Figure 1. Bathymetric charts for the central Okinawa Trough
Scientific drilling by *Chikyu* at the Izena Hole (A in the figure),
Placement of a genesis monitoring device south of the Iheya Small Ridge
(B in the figure)

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