doi : 10.17596/0002971

R/V KAIYO Cruise Report
KY13-E02

Technology component test of a shuttle vehicle and pilot test of the high-resolution prospecting system under the seabed for sea-floor hydrothermal deposit

Okinawa Trough

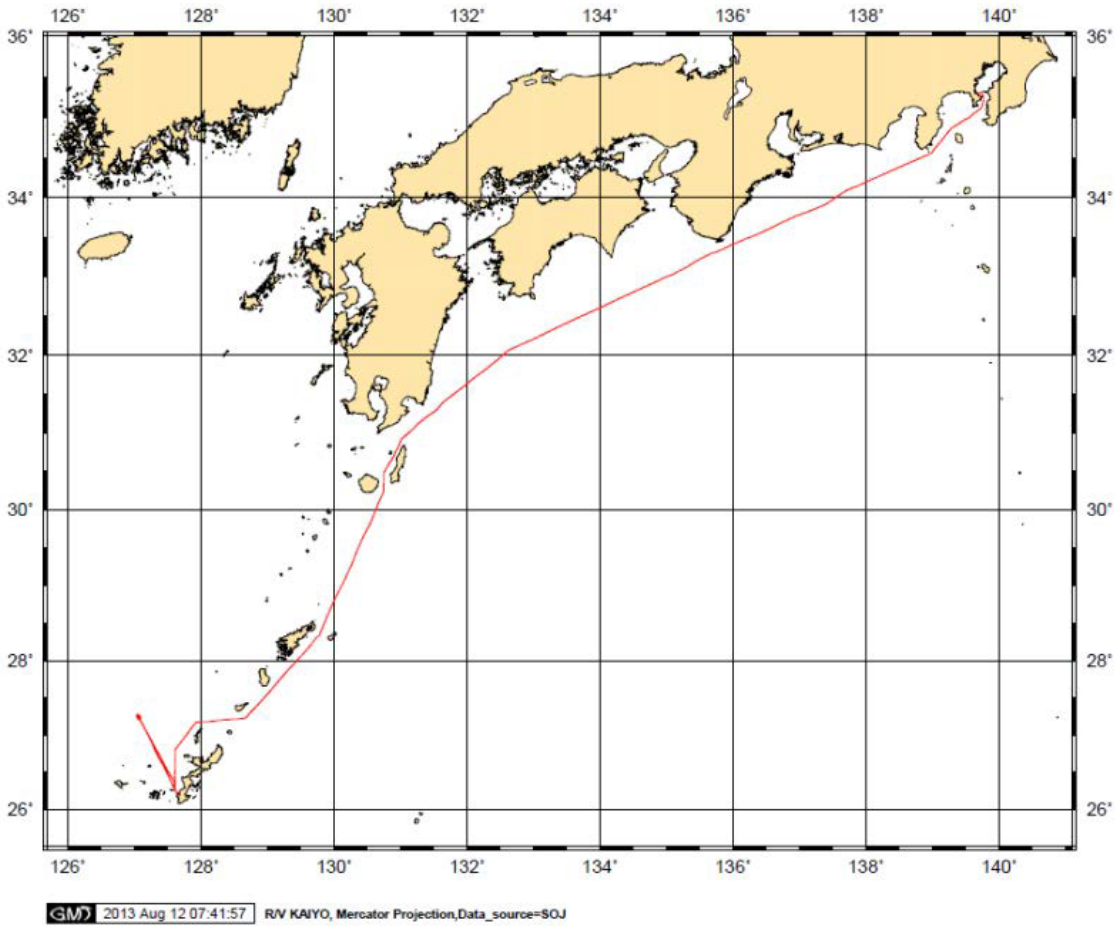
August 3 to 12, 2013

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

1. Cruise Information

● Cruise ID KY13-E02
● Name of vessel R/V KAIYO
● Title of the cruise
Technology component test of a shuttle vehicle and pilot test of the high-resolution prospecting system under the seabed for sea-floor hydrothermal deposit
● Title of proposal
Masami Matsuura, MARITEC, JAMSTEC
Technology component test of a shuttle vehicle falling freely in the deep-sea
Hidekazu Tokuyama, Kochi University
Pilot test of the high-resolution prospecting system with the high-frequency sound generator and the Vertical Cable Seismic
● Cruise period August 3 to 12, 2013
● Ports of departure / call / arrival JAMSTEC Yokosuka / Naha Okinawa
● Research area Okinawa Trough Izena cauldron, Iheya ridge (water depth of 600m to 2,000m)
● Research Map

Research area



2. Research party

● Chief Scientist and Representative of the science party:

Masami Matsuura	JAMSTEC

● Science party

Tetsuya Miwa	JAMSTEC
Tatsuhiro Fukuba	JAMSTEC
Hidekazu Tokuyama	Kochi University
Kenji Tara	University of Tokyo
Yasuhiro Asano	Waseda University
Naoto Takahashi	Waseda University
Yoshihiro Nakasato	Kochi University
Keisuke Nishi	Kochi University
Seiki Ogawa	JGI
Koji Ishikawa	JGI
Satoshi Otaki	JGI
Eiichi Asakawa	JGI
Fumitoshi Murakami	JGI
Hitoshi Tsukahara	JGI
Hiromichi Ito	Technical service
Yuzuru Ito	Ocean Engineering Research, Inc.
Syohei Taketomo	MWJ
Tetsuharu Iino	MWJ
Hiroyasu Monma	NME
Hitoshi Kosono	NME

R/V KAIYO CREW

Captain	**INOUE TAKAMICHI**
Chief Officer	SHISHIKURA TAKAAKI
2nd Officer	CHIBA MASATO
3rd Officer	FUJII SHUNSUKE
Jr.3rd Officer	YUKAWA TOMOHIRO
Chief Engineer	ABE TADASHI
1st Engineer	MATSUKAWA KIMIO
2nd Engineer	MORI TAKAHIRO
3rd Engineer	OTSUGA YOSHIHIRO
Jr.3rd Engineer	MIYAZAKI SHOHEI
Chief Radio Operator	HATTORI TAKEHITO
2nd Radio Operator	FUKAGAWA SHUNSUKE
3rd Radio Operator	YUASA TOSHIHIKO
Boat Swain	YATOGO KOZO
Able Seaman	TAKUNO SHUJI
Able Seaman	YOSHINO YUKI
Able Seaman	MATSUO YOSHIAKI
Sailor	UZUKI SHINSUKE
Sailor	KUBOTA TOMOAKI
Sailor	HORII YOSUKE
Sailor	TAMURA RYOMA
No.1 Oiler	YOSHIDA KATSUYUKI
Oiler	FUNAWATARI KEITA
Assistant Oiler	KOZAKI MAKOTO

Assistant Oiler	HIDAKA TORU
Assistant Oiler	MITSUO NAOTO
Chief Steward	TAKEMURA RYUEI
Steward	HIRAYAMA KAZUHIRO
Steward	MURAKAMI TORU
Steward	YUASA KANA
Steward	KINOSHITA HARUKA
Steward	EBIKO YOHEI

3. Research/Development Activities

● Research overview

For development of a new shuttle vehicle which arrives at the seabed by free fall, the performance of a pressure tight case of glass sphere, the operation of weight releaser, the sensitivity of the chemical sensor, etc. carried out the component test. These examinations were aimed at realization of reduction of a production cost. These apparatus that passed the test tank examination did the actual proof examination by the hydrothermal deposit, and checked reliability.
Contracted research of Kochi University “Pilot test of the high-resolution prospecting system with thehigh-frequency sound generator and the Vertical Cable Seismic” was carried out in this cruise.

●Technology component test of a shuttle vehicle falling freely in the deep-sea

Masami Matsuura, Tetsuya Miwa, Tatsuhiro Fukuba

A free fall type deep sea exploration shuttle vehicle was developed. The performance of the newly designed glass ball pressure vessel was verified. The operation of the new separation device and the technical element test of the chemical sensor installed were carried out in the submarine hydrothermal deposit area.

Equipment and containers prepared as a free fall-type deep sea exploration shuttle vehicles, manufacturing cost compared with the conventional has been dramatically reduced. However, these devices or containers had little practical experience and were worried about stability. It was installed in a hydrothermal vent area in a real environment, and the stability of the container could be evaluated. This result was achieved with a compact and inexpensive device such as “Edokko Mk 1”. The validity and reliability could be confirmed.

●Pilot test of the high-resolution prospecting system with thehigh-frequency sound generator and the Vertical Cable Seismic

Hidekazu Tokuyama, Kenji Tara, Yasuhiro Asano, Naoto Takahashi, Yoshihiro Nakasato, Keisuke Nishi, Seiki Ogawa, Koji Ishikawa, Satoshi Otaki, Eiichi Asakawa, Fumitoshi Murakami, Hitoshi Tsukahara, Hiromichi Ito, Yuzuru Ito, Syohei Taketomo, Tetsuharu Iino, Hiroyasu Monma, Hitoshi Kosono

The real sea test exploration system developed for imaging the shape of the seabed resources at high resolution were performed. A vertical seismic cable (VC) was set up about 100m from the sea floor. Four VCs were installed in series at intervals of 100m to 150m.

After installing the VC, the NSS equipped with a hydraulic exciter and an electromagnetic exciter was used to ground the exciter on the sea floor and transmit high frequency sound. The reflected sound from the bottom of the sea was measured and recorded by a hydrophone placed vertically above the VC. At night, a towing test was conducted using a sparker as the epicenter, and the reflected sound from the bottom of the sea was measured and recorded by VC as described above. These are operational tests, and we tried to grasp the three-dimensional extent of the submarine hydrothermal deposit.

4. Cruise Log

August 3 10:00 Departed in Yokosuka port 35-17.0N,139-40.7E
August 7 09:15 Arrived in Naha port 26-14.2N,127-40.8E
August 7 15:00 Departed in Naha port 26-14.2N,127-40.8E
August 8 07:00 Arrived in Izena caldera 27-14.5N,127-04.1E
August 8 07:02 XBT
August 8 08:14-10:15 Shuttle vehicle test conducted
August 8 13:21 VC Installation (VCS#3)
August 8 14:00 VC Installation (VCS#4)
August 8 14:38 VC Installation (VCS#2)
August 8 15:15 VC Installation (VCS#1)
August 8 15:32-37 VC Position measurement
VCS#1（27-14.67113N,127-03.95742E d=1621m ）

VCS#2（27-14.62504N,127-03.98227E d=1614m）
VCS#3（27-14.56943N,127-04.01684E d=1612m）
VCS#4（27-14.57141N,127-03.93734E d=1620m）

August 8　16:19　XCTD Observation
August 8　21:00 - August 9　08:04 Sparker towing observation
August 9　08:58　Landing NSS-grounded sound source
August 9　16:36　Collection of NSS-grounded sound source
August 9　16:48 – August 10 07:44　Sparker towing observation
August 10　08:11　Landing NSS-grounded sound source
August 10　16:23　Collection of NSS-grounded sound source
August 10　16:36 – August 11 06:12　Sparker towing observation
August 11　07:04　Landing NSS-grounded sound source
August 11　16:30　Collection of NSS-grounded sound source
August 12　09:00　Arrived in Naha port 26-14.2N,127-40.8E

5. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.
This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.
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