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YOKOSUKA “Cruise Report”
YK18-03

Evaluation test of Underwater Recharging System (URS) using Autonomous Underwater Vehicle (AUV)

Omuro-dasi

Mar.12,2018-Mar.16,2018

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

Contents

1. Cruise Information

● Cruise ID :
YK18-03

● Name of vessel :
YOKOSUKA

● Title of cruise
Evaluation test of Underwater Recharging System (URS) using Autonomous Underwater Vehicle (AUV)

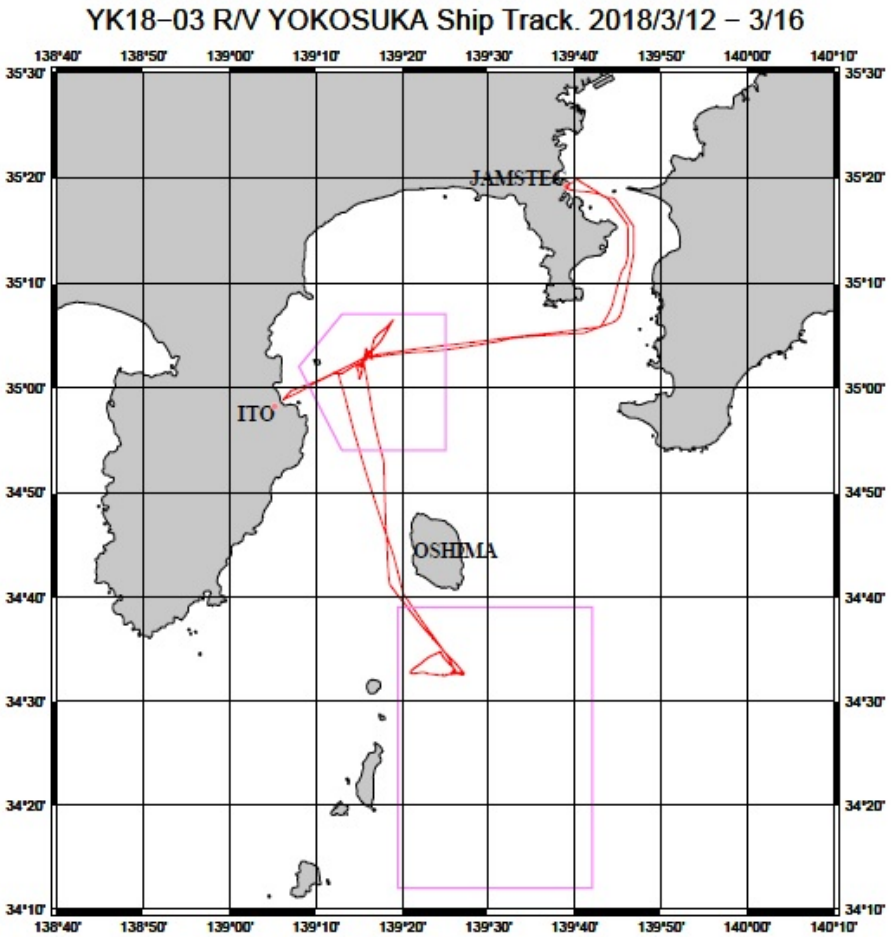
● Chief Scientist [Affiliation] :
Kiyotaka Tanaka

● Cruise period :
Mar.12,2018-Mar.16,2018

● Ports of departure / call / arrival :
Yokosuka (JAMSTEC) / Yokosuka (JAMSTEC)

● Research area :
Sagami bay , Omuro-dasi

● Research map



2. Researchers

● Title of proposal

Development of Underwater Recharging System (URS)

● Representative of Science Party [Affiliation]

Kiyotaka Tanaka [JAMSTEC]

● Science Party (List) [Affiliation, assignment etc.]

Kiyotaka Tanaka	[JAMSTEC]
Tetsuya Miwa	[JAMSTEC]
Yoshitaka Watanabe	[JAMSTEC]
Makoto Sugesawa	[JAMSTEC]
Yutaka Oota	[JAMSTEC]
Minoru Suzuki	[Mitsubishi Electric Tokki System]
Toshiaki Miyoshi	[Mitsubishi Electric Tokki System]

● Marine Technicians (List) [Affiliation, assignment etc.]

Hiroyuki Hayashi	[Nippon Marine Enterprises]

● R/V YOKOSUKA Crew

Captain	Yoshiyuki NAKAMURA
Chief Officer	Yasuhiko SAMMORI
2nd Officer	Shozo FUJII
3rd Officer	Ryo YAMAGUCHI
Chief Engineer	Tadashi ABE
1st Engineer	Kazunori NOGUCHI
2nd Engineer	Katsuto YAMAGUCHI
3rd Engineer	Takamasa OCHIAI
Jr.3rd Engineer	Hiroki KAITO
Chief Electronics Operator	Tokinori NASU
2nd Electronics Operator	Ryosuke MATSUI
Boat Swain	Hideo ISOBE
Able Seaman	Kazumi OGASAWARA
Able Seaman	Tsugumi SASAKI
Able Seaman	Tsuyoshi CHIMOTO
Able Seaman	Kaito MURATA
Sailor	Kyohei MURAI
Sailor	Tomoki ASAKUNI
No.1 Oiler	Junji MORI
Oiler	Katsuyuki MIYAZAKI
Oiler	Toshinori MATSUI
Oiler	Makoto KOZAKI
Assistant Oiler	Aoi TAKAMIYA
Chief Steward	Sueto SASAKI
Steward	Shinsuke TANAKA
Steward	Hiroyuki OHBA
Steward	Koichiro KASHIWAGI
Steward	Koki SHINOHARA

3. Experiment of URS

3.1 Purpose

This cruise is aimed at evaluating function / performance under a seawater 200 m water pressure environment of a contactless charging station.

Confirm that charging can be performed with non-contact power transmission to the otohime battery under a hydraulic environment of 200 m. We also confirm that power transmission is possible with transmission power of 1 KW or more and transmission efficiency of 70% or more.

3.2 Activities

Table 3.2-1 shows the schedule of the cruise.

Table 3.2-1 Schedule of the cruise.

Date	Plans / Place	Actual activities
Mar. 12,2018	Depart / Yokosuka(JAMSTEC)	Cruise , Launch and recovery test
Mar. 13,2018	Sea Trial of Otohime & URS / Omuro-dasi	Sea Trial / Sagami bay
Mar. 14,2018	Sea Trial of Otohime & URS / Omuro-dasi	Sea Trial / Sagami bay
Mar. 15,2018	Sea Trial of Otohime & URS / Omuro-dasi	Sea Trial / Sagami bay
Mar. 16,2018	Arrival / Yokosuka(JAMSTEC)	Cruise

3.3 Results

In this cruise, we confirmed the transmission power, the power transmission confirmation to confirm the transmission efficiency, and the confirmation of the otohime battery charging sequence.

Both tests were conducted at depths exceeding 200 m. Especially, confirmation of the battery charge sequence was carried out by putting it on the bottom of the sea at the water depth of 202 m and conducting the evaluation test, it was possible to fully charge the otohime loaded battery without problems.

In the power transmission confirmation, data acquisition is performed by changing the relative positions of the power transmission coil unit and the power receiving coil unit, the results shown in Table 3.3-1 are obtained, and the targeted received power of 1 KW or more and the transmission efficiency of 70% or more Satisfactory results were obtained.

Table3.3-1 URS Evaluation Test Results

Relative position of transmission and receiving coil(mm)	Receiving Power	Transmission efficiency
Horizontal Error:0 , Coil Gap:0	1.1KW	86%
Horizontal Error:40 , Coil Gap:0	1.1KW	85%
Horizontal Error:0 , Coil Gap:30	1.1KW	85%

3.4 About URS

URS is under development for the purpose of charging the AUV battery in the sea.
128V, 30Ah batteries can be charged in about 4 hours, the following specifications were adopted.

Received power : 1kW or more
Power transmission efficiency : 70% or more

Figure 3.4-1 shows a schematic diagram of non-contact charging for URS and Otohime.
In addition, Figure 3.4-2 shows the state where URS used in this cruising and Otohime are combined.

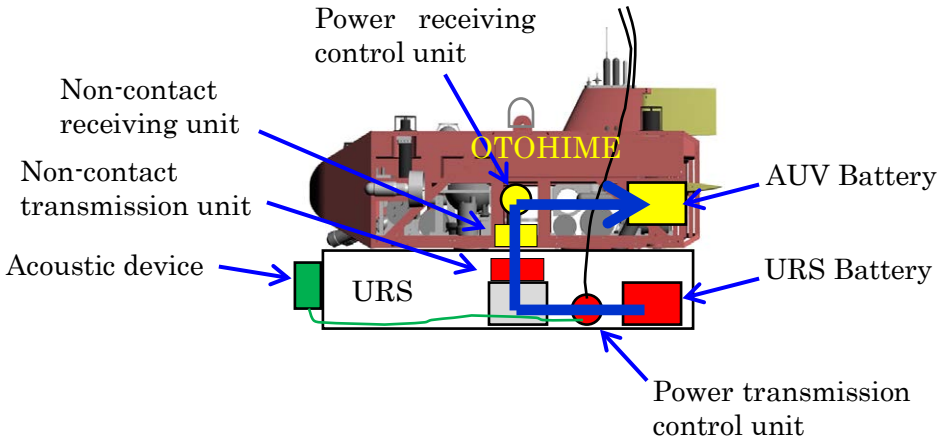


Fig. 3.4-1 Schematic diagram of URS

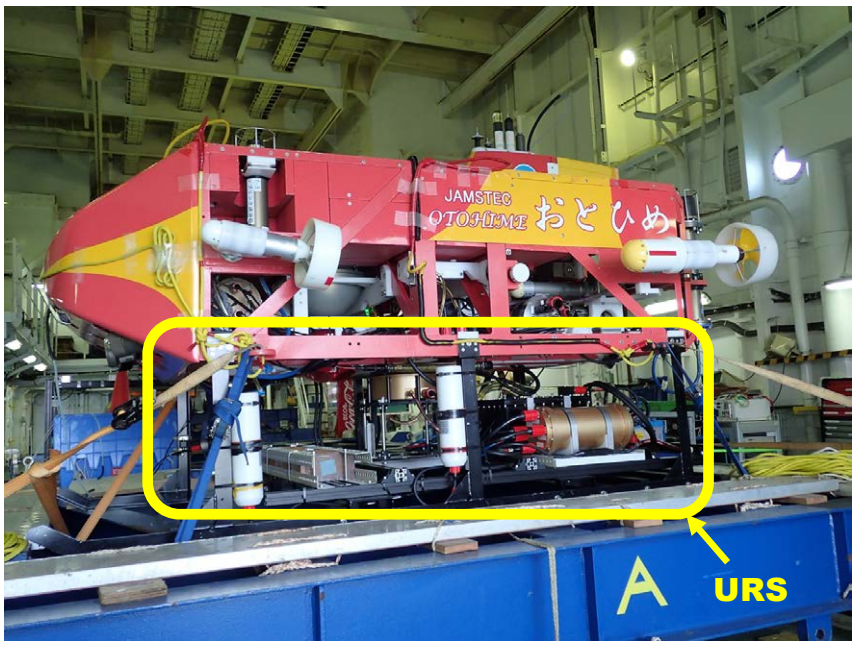


Fig. 3.4-2 OTOHIME & URS

3.5 Acknowledgements
We are grateful to the captain Satoshi Susami and the all crews of the R/V Kaimei/Kaikou for their invaluable supports during the cruise.

4. Notice on Using

Notice on using: Insert the following notice to users regarding the data and samples obtained.