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Yokosuka “Cruise Report”

YK17-04

Sea trial of Autonomous Underwater Vehicle “Yumeiruka”

Sagami bay and Suruga bay

Mar.4,2017-Mar.7,2017

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

Contents

1. Cruise Information

1.1 Cruise ID

YK17-04

1.2 Name of vessel

Yokosuka

1.3 Title of the cruise

Sea trial of Autonomous Underwater Vehicle “Yumeiruka”

1.4 Cruise period

Mar.4,2017-Mar.7,2017

1.5 Ports of departure / call / arrival

Departure from: JAMSTEC Yokosuka on Mar. 4th

Arrival at Shimizu port on Mar. 7th

1.6 Research area

Sagami bay and Suruga bay

1.7 Research Map

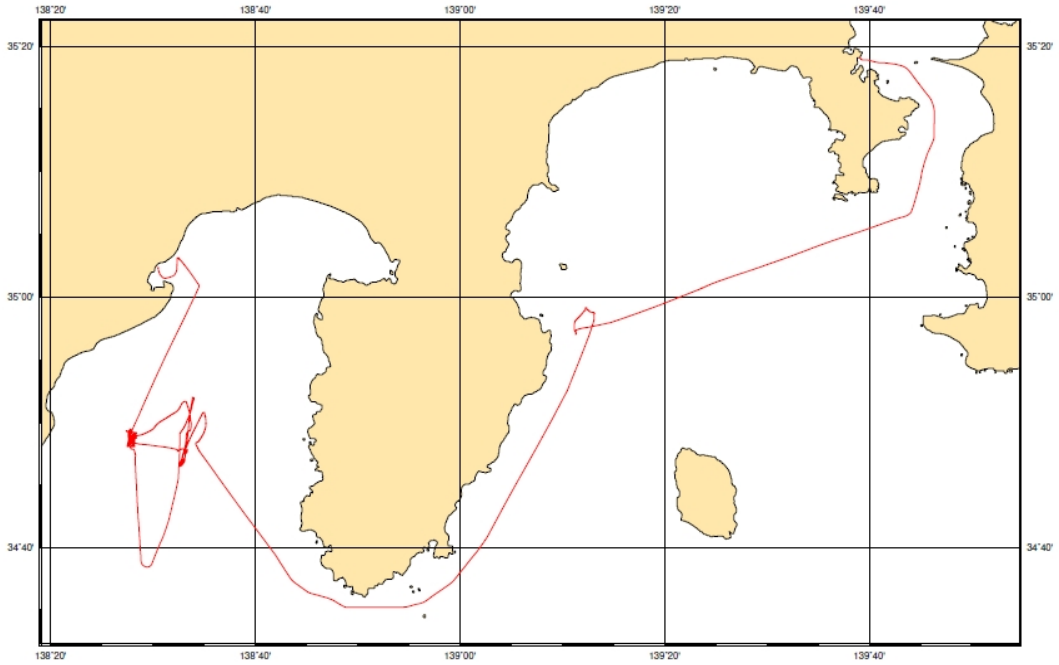

Fig. 1 Cruise track of YK17-04

2. Researchers

2.1 Chief scientist [Affiliation]

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2.2 Science party [Affiliation]

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Tuyoshi Yoshiume	[JAMSTEC]
Yoshinobu Nambu	[JAMSTEC]
Kazuhiro Kanayama	[MHI]
Hiroyuki Miyake	[RSG]

*MHI: Mitsubishi Heavy Industries, Ltd

*RSG: Ryoyu System Engineering Co., Ltd.

3. Observation

3.1 Purpose

This cruise was conducted to verify the capability of “Yumeiruka”. Until this sea trial, we improved the observation performance that the AUV equipped with IFS (or SAS) and SBP at the same time. For about navigation performance, we conducted the improvement of algorism of altitude control. Additionally, this is the first-time cruise to operate the “Yumeiruka” by support vessel “Yokosuka”. Therefore, we also checked the fitting and operability of launch and recovery system for the “Yumeiruka”.

3.2 Activities

Table 1 shows the schedule of the cruise. In this cruise we conducted three dives of AUV “YUMEIRUKA”. To verify the capability of its navigation and observation performance.

Table 1 Schedule of the sea trial.

Date	Plans / Place	Actual activities
Mar. 4, Sat.	Depart / JAMSTEC Sea Trial / Sagami bay	Launch and recovery test with Dive# 22
Mar. 5, Sun.	Sea Trial / Suruga bay	Dive# 23
Mar. 6, Mon.	Sea Trial / Suruga bay	Dive# 24
Mar. 7, Tue.	Arrive / Shimizu port	Prepare for next cruise

3.3 Dive information

Table 2 shows the dive information of AUV “YUMEIRUKA” during YK17-04 cruise. We conducted 3 dives of the AUV (include launch and recovery test) to verify the capability of the AUV and prepare for YK17-05 cruise.

a) Dive #22

It was conducted as system check of AUV “YUMEIRUKA” and test of launch and recovery system by R/V “YOKOSUKA”.

b) Dive #23

To verify the altitude control, we decided a course line of the AUV to ascend and descend at a submarine-hill which difference of altitude is about 100 m in Suruga-bay.

c) Dive #24

Set the same course line with dive #23 to compare the difference of altitude control gain of the AUV.

Table 2 Dive information.

Dive#	Date, Time	Depth / Altitude	Remarks
#22	Mar. 4 13:38(Launch) ~ 16:01(Surfacing)	739 m / 120 m	Launch and Recovery Test
#23	Mar. 5 11:08(Launch) ~ 13:39(Surfacing)	848 m / 90 m	Nav. and observation test
#24	Mar. 6 8:51(Launch) ~ 15:45 (Surfacing)	847 m / 100 m	Nav. and observation test

*Depth is the maximum value during the dive.

*Altitude is an averaged value during the observation.

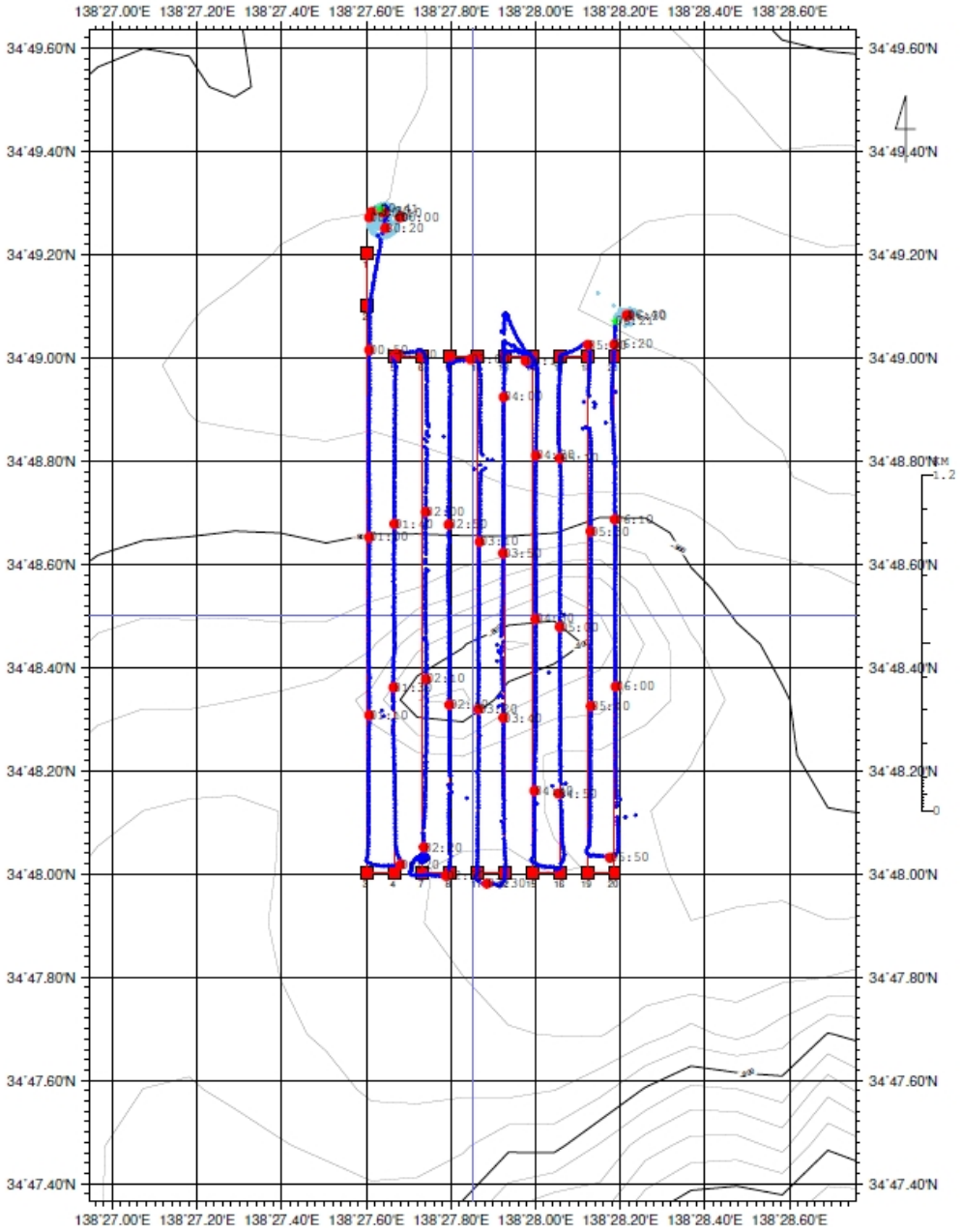

Fig. 2 Cruise track of Dive# 24.

3.4 About “Yumeiruka”

AUV "Yumeiruka" was developed to perform seabed resource survey. "Yumeiruka" is equipped with two sets of X-rudders, one in the front, and one in the rear part of the vehicle. This arrangement of the rudders enables the vehicle to trace the sea bottom with controlled attitude. For example, "Yumeiruka" can follow the terrain of an irregular seabed with its pitch angle fixed to 0 degree. The attitude control capability allows the vehicle to aim the onboard sensors vertically at the sea bottom, resulting in more efficient survey of the seafloor.

Table. 3 Specifications of “Yumeiruka”

Items	Specification
Dimensions (L, B, H)	5.0 m, 1.4 m, 1.4 m
Weight (in air)	2,700 kg
Maximum Operation Depth	3,000 m
Cruising Speeds	2 knots (Max. 3 knots)
Propulsion System	4 × 400W thrusters, 2 × X-rudders (fore and rear)
Power Source	Rechargeable lithium ion battery
Endurance	16 hours
Navigation sensors	INS, DVL, SSBL
Observation sensors	CTD, pH meter, fluoro meter, IFS, SAS, SBP

Fig. N AUV “Yumeiruka”

4. Notice on Using

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

This cruise report is a preliminary documentation as of the end of the cruise.
This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.
Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.