



R/V Yokosuka Cruise Report

YK18-E01

Sea Trial of AUV “AUV-NEXT”

And

Experiment of Unmanned Sea Operation Using ASV

Sept. 19, 2018 - Sept. 25. 2018

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

Contents

- 1. Cruise Information**
- 2. Researchers**
- 3. Experiment of Unmanned Sea Operation Using ASV**
- 4. Test of Acoustic communication at a depth of 4,000m**

1. Cruise Information

- Cruise ID: YK18-E01
- Name of vessel: R/V Yokosuka
- Title of the cruise:
Sea trial of AUV “AUV-NEXT” and experiment of unmanned sea operation using ASV
- Cruise period: September 19, 2018 - September 25, 2018
- Ports of departure / call / arrival: Yokosuka (JAMSTEC) - Yokosuka (JAMSTEC)
- Research area: Sagami Bay and Nankai Trough
- Research Map

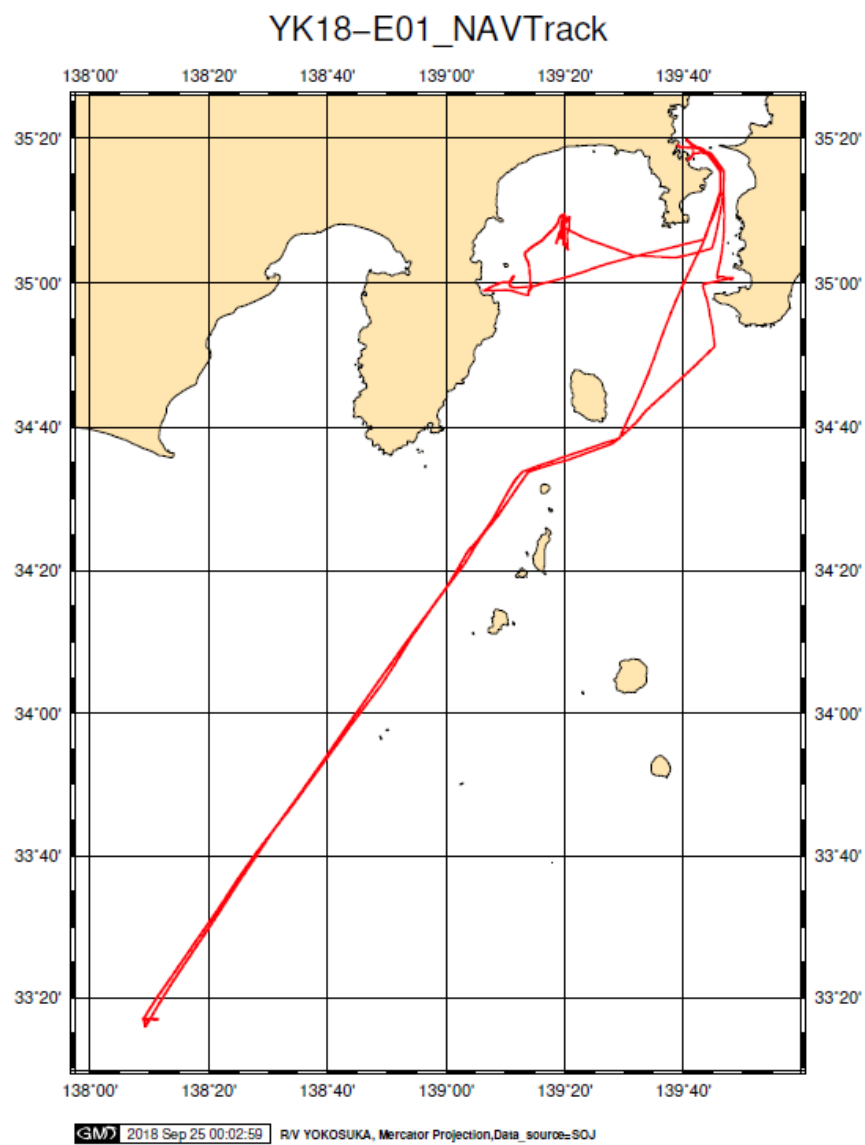


Fig1. Cruise track of YK18-E01

2. Researchers

- Chief Scientist [Affiliation]: Takeshi Nakatani [JAMSTEC]
- Science party (List) [Affiliation, assignment etc.]
 - Shinobu Omika [JAMSTEC]
 - Hiroshi Ochi [JAMSTEC]
 - Yutaka Ohta [JAMSTEC]
 - Yuta Shindo [JAMSTEC / Yamaha Motor]
 - Junichi Kojima [KDDI Research]
 - Masaya Katagiri [NME]
 - Hitoshi Kakami [Mitsui E&S shipping]
 - Yuta Asai [Mitsui E&S shipping]
 - Atsushi Koizumi [Mitsui E&S shipping]
 - Kazunori Toki [Mitsui E&S shipping]
 - Takamasa Ambiru [JAMSTEC]
 - Mitsuteru Kuno [NME]

3. Experiment of Unmanned Sea Operation Using ASV

- Purpose

JAMSTEC developed "AUV-NEXT" in 2018. This cruise was conducted to test the whole system of "AUV-NEXT". Simultaneously, we had experiment of unmanned AUV operation using ASV "ORCA".

- AUV "AUV-NEXT"

AUV "AUV-NEXT" was developed as a testbed in a project "Development of next-generation system for deep-sea exploration" in JAMSTEC. "AUV-NEXT" is a 4,000m class cruising AUV. The main purpose is seafloor sonar mapping of vast area with high speed. The vehicle has a capability to cruise at 3knot for 40hours.



Fig.2 AUV "AUV-NEXT"

Table 1 Specifications of “AUV-NEXT”

Size[L×B×H](m)	5.6 x 1.8 x 1.7
Mass in Air(kg)	2,300
Depth Rating(m)	4,000
Velocity(kn)	4.5
Duration	40hrs@3knot
Power Supply	Li-ion

- Activities

Table 2 shows the activities of the cruise. In this cruise, we conducted one dive of AUV “AUV-NEXT” and an acoustic communication test at NANKAI trough.

Table 2 Schedule of YK18-E01 cruise

Date	activities
Sept. 19	Departured from YOKOSUKA (JAMSTEC pier) Launch and recovery test of “AUV-NEXT” and "ORCA" at SURUGA Bay
Sept. 20	"AUV-NEXT" Dive#3
Sept. 21	Rough sea state / TOKYO Bay
Sept. 22	Arrived at YOKOSUKA-Shin-Kou
Sept. 23	Departured from YOKOSUKA-Shin-Kou Proceed to NANKAI Trough
Sept. 24	Acoustic communication test at NANKAI Trough
Sept. 25	Arrived at YOKOSUKA (JAMSTEC pier) Unloading the equipment

- Results

This was the first time to operate “AUV-NEXT” and “ORCA” using R/V Yokosuka. Therefore, we had launch and recovery test in Sept. 19. Fig.3 shows the trajectory of “AUV-NEXT” during Dive #3. The maximum operation depth was 1,205m. We verified its acoustic communication, navigation control and observation functions through the sea trial.

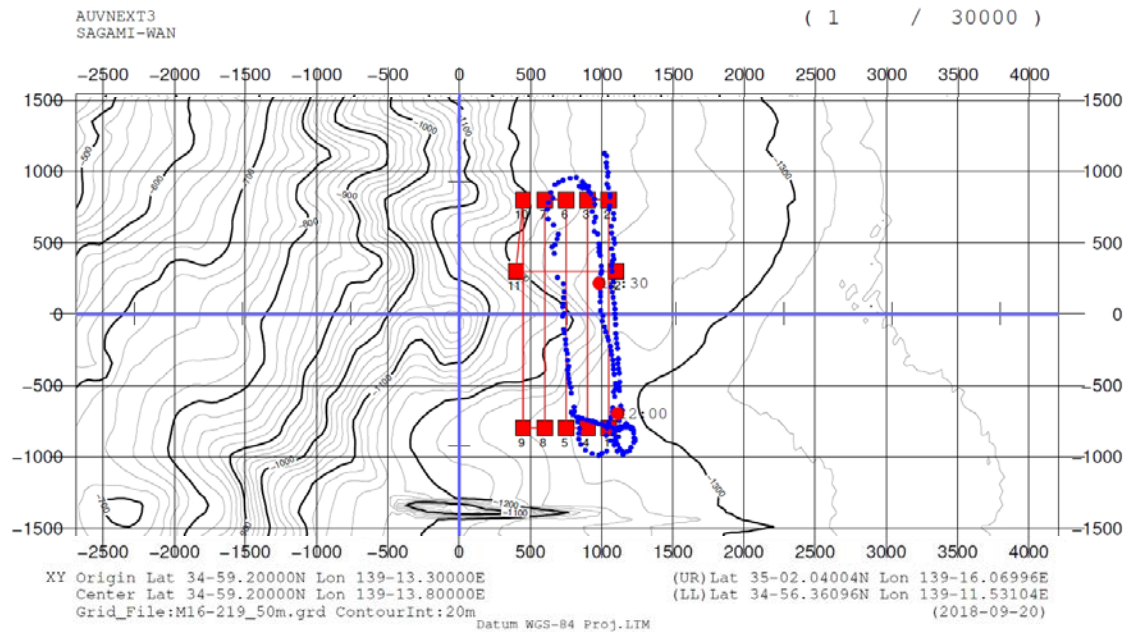


Fig.3 Trajectory of “AUV-NEXT” during Dive #3

4. Test of Acoustic communication at a depth of 4,000m

We conducted an acoustic communication test at a depth of 4,000m. Fig.4 shows the experimental configuration. The acoustic modems (Evologics S2CR 7-17) were mounted on ASV “ORCA” and the end of YK-DT winch. For ground truth of positioning, the transponder at the end of the winch was measured by SSBL system of R/V Yokosuka. We got the distance and directional property data.

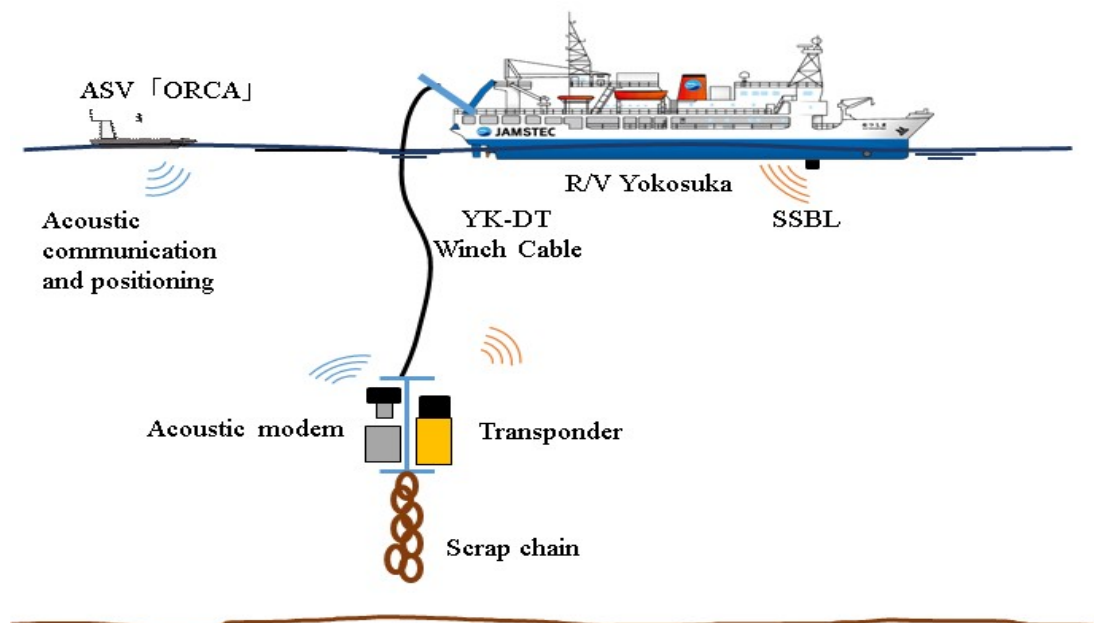


Fig.4 Configuration of acoustic communication test at a depth of 4,000m

5. Notice on Using

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.

Acknowledgement

We would like to thank the captain Takafumi Aoki and his crew of the R/V Yokosuka, and Akihisa Ishikawa and the AUV technical support team (Nippon Marine Enterprises, Ltd.) for AUV safe operation and great support during the cruise.