



R/V Kaimei Cruise Report  
KM21-11

Development of continuous real-time monitoring  
technology for seafloor deformation

Kumano-nada, off Kii-suido and off Hatsushima

Nov. 07, 2021 – Nov. 19, 2021

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

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## 1. Cruise Information

Cruise ID: KM21-11

Name of vessel: KAIMEI

Title of project: Development of continuous real-time monitoring technology for seafloor deformation

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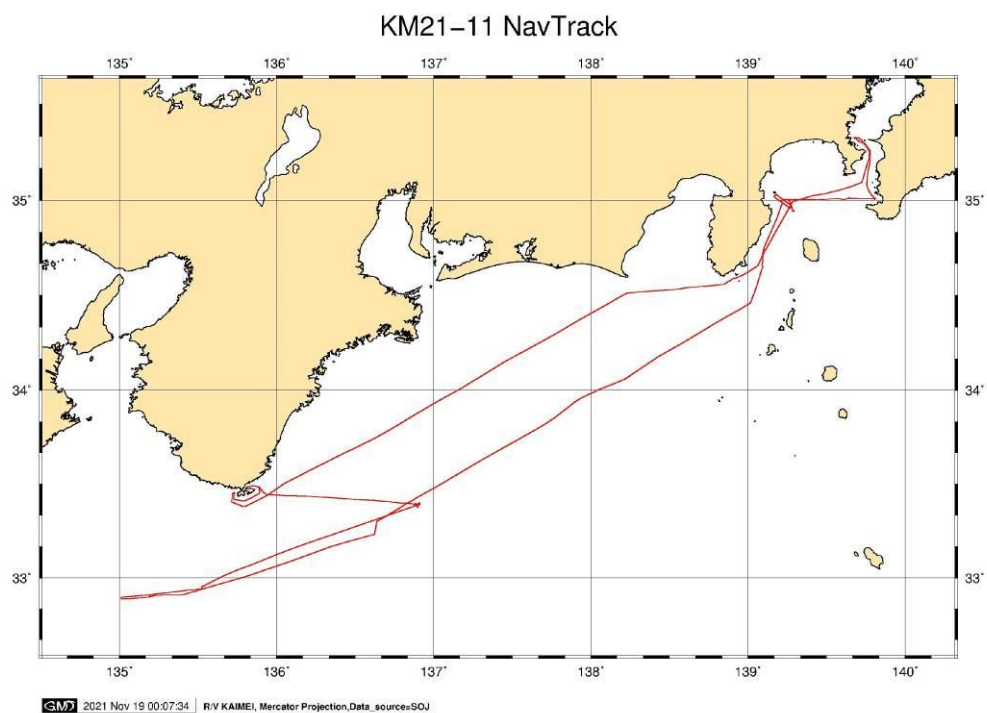
Chief Scientist [Affiliation] : Hiroyuki MATSUMOTO [JAMSTEC]

Cruise period: 2021/11/07 – 2021/11/19

Ports of departure / call / arrival: Yokosuka Port/Yokosuka Port

Research area: Kumano-nada, off Kii-suido and off Hatsushima

Research map



## 2. Research Proposal and Science Party

- Title of proposal: Development of continuous real-time monitoring technology for seafloor deformation
- Representative of Science Party [Affiliation] : Eiichiro ARAKI [JAMSTEC]
- Science Party (List) [Affiliation, assignment etc.]
  - Hiroyuki Matsumoto [JAMSTEC]
  - Takashi Yokobiki [JAMSTEC]
  - Kenya Yamanaka [Nippon Marine Enterprises]

## 3. Research/Development Activities

### 3.1. BMS observatory backfilling

The objective of this cruise is to fill the BMS borehole with sand. The current status of the BMS borehole observatory is shown in Fig. 1 Filled back with mortar at the sensor section was completed, and the sand section reached approximately 5 m. Remaining 19 m should be filled back with sand in the present cruise. Payload tools of KM-ROV are shown in Fig 2. The bag filled with sand will be broken by a cutter, and flow-down the sand into the BMS borehole. Photos of KM-ROV dive operation are shown in Figs. 3 and 4 As a result sand of 480 liters in total by three dives was used to fill the BMS borehole observatory (Fig. 5).

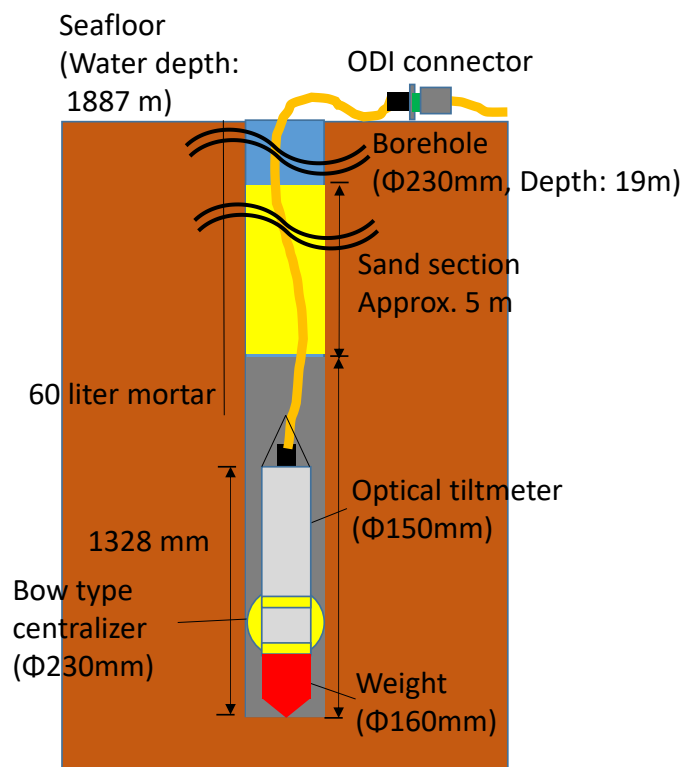


Fig. 1 Schematic figure of BMS borehole observatory

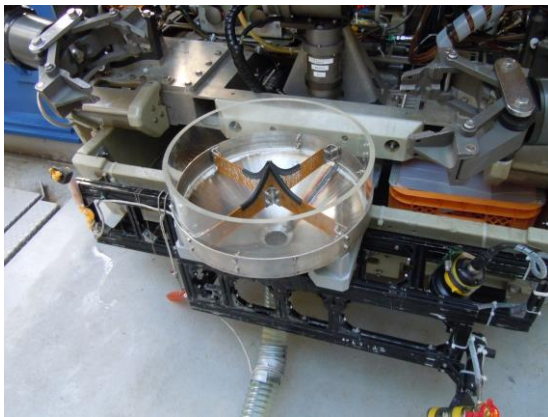


Fig. 2 Hopper and attachment tube on KM-ROV

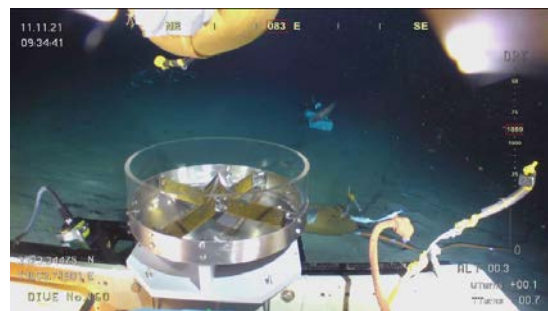


Fig. 3 KM-ROV #160 dive operation

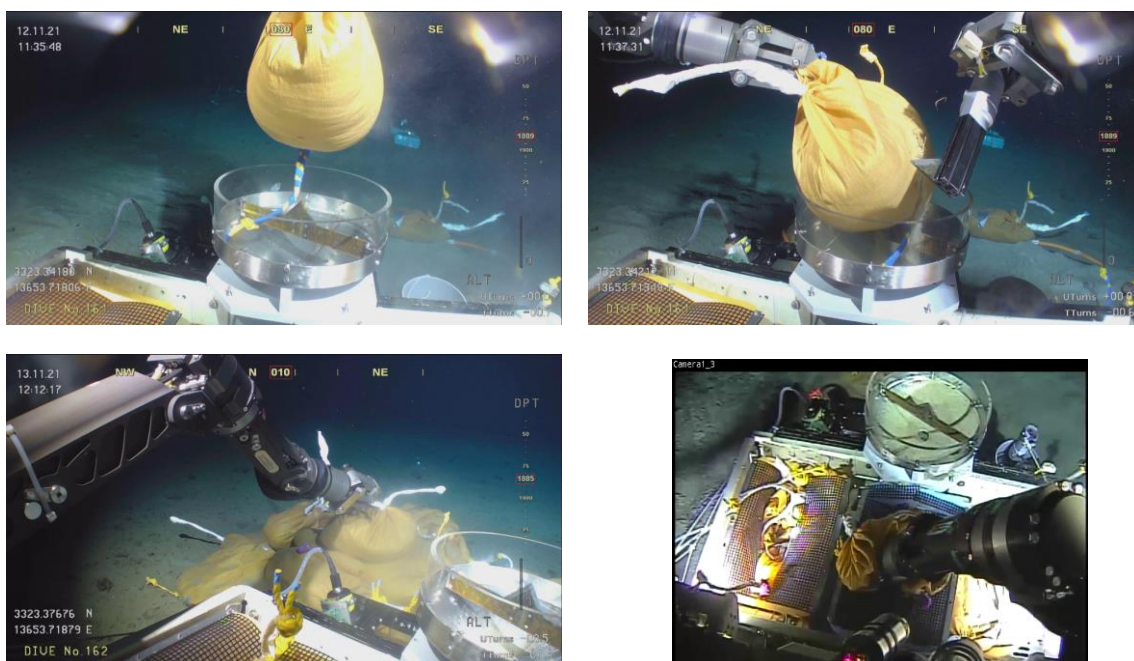


Fig. 4 KM-ROV #162 dive operation

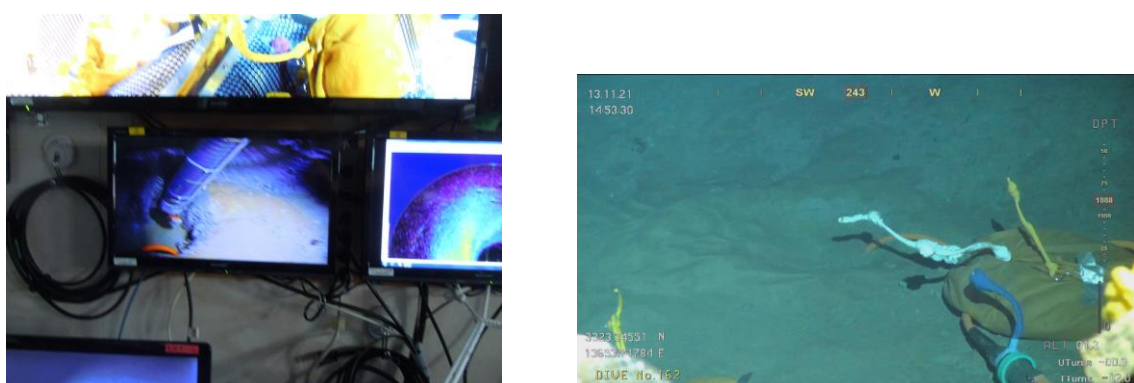


Fig. 5 BMS borehole observatory after the operation

### 3.2. Recover of mortar sample

At the last dive i.e., KM-ROV #162 dive, one of the mortar samples was recovered (Fig. 6).

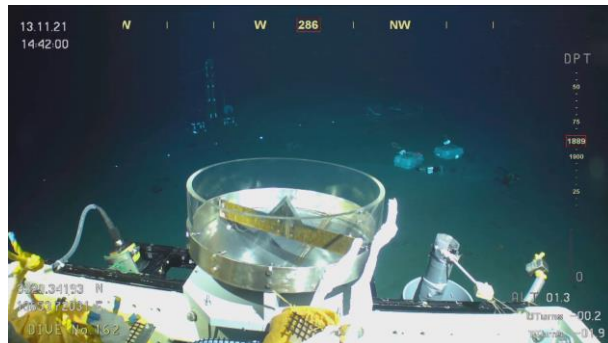


Fig. 5 Recovery of the mortar sample

### 3.3 Observation around the 1B-S1 observatory

We conducted the visual observation around the 1B-S1 observatory.

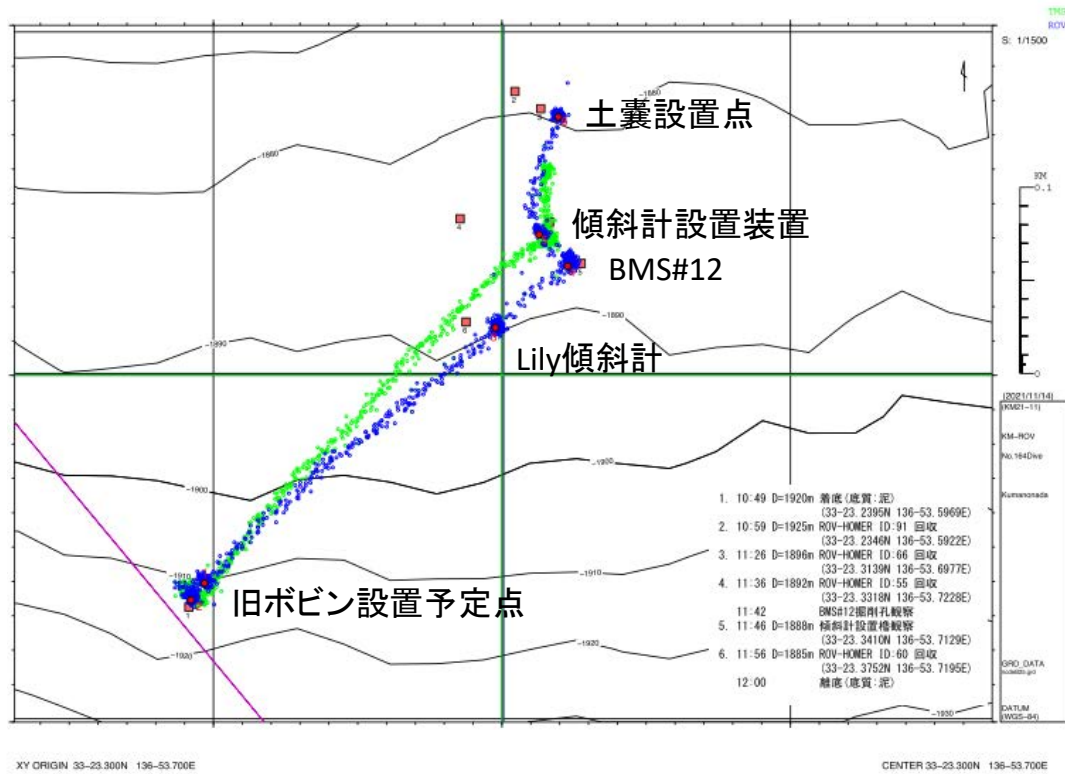


Fig. 6 KM-ROV track for the visual observation around the 1B-S1 observatory



Fig. 7 The Lily tilt-meter site (left) and the equipment for deployment

### 3.4 Site survey around 2F-S2

Site survey for new BMS borehole observatory was conducted at the 2F-S2 and C0002 sites. At 2F-S2 site, we tested at different four sites, however we did not find a suitable site to deploy the BMS borehole. At C0002 site, the same test was implemented 15 times, but there is no suitable site for a BMS borehole.

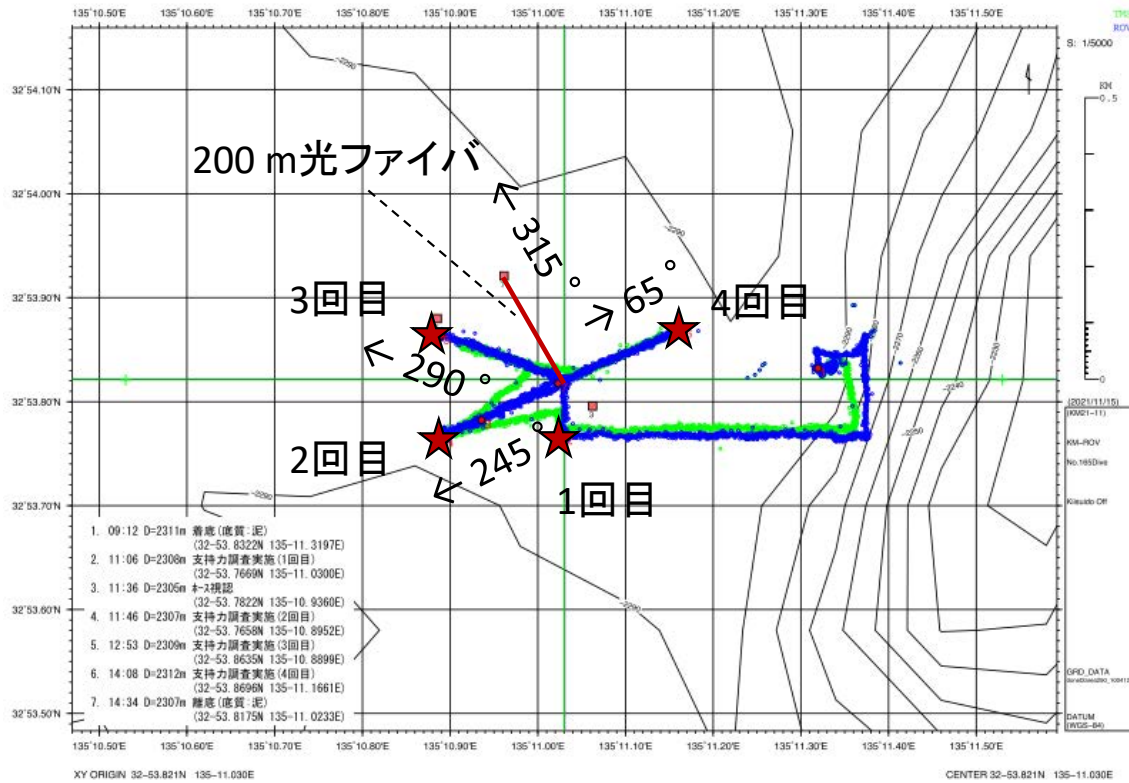


Fig. 8 ROV dive track at 2F-S2 site



Fig. 9 Stiffness test using dead-weight stick at 2F-S2 site

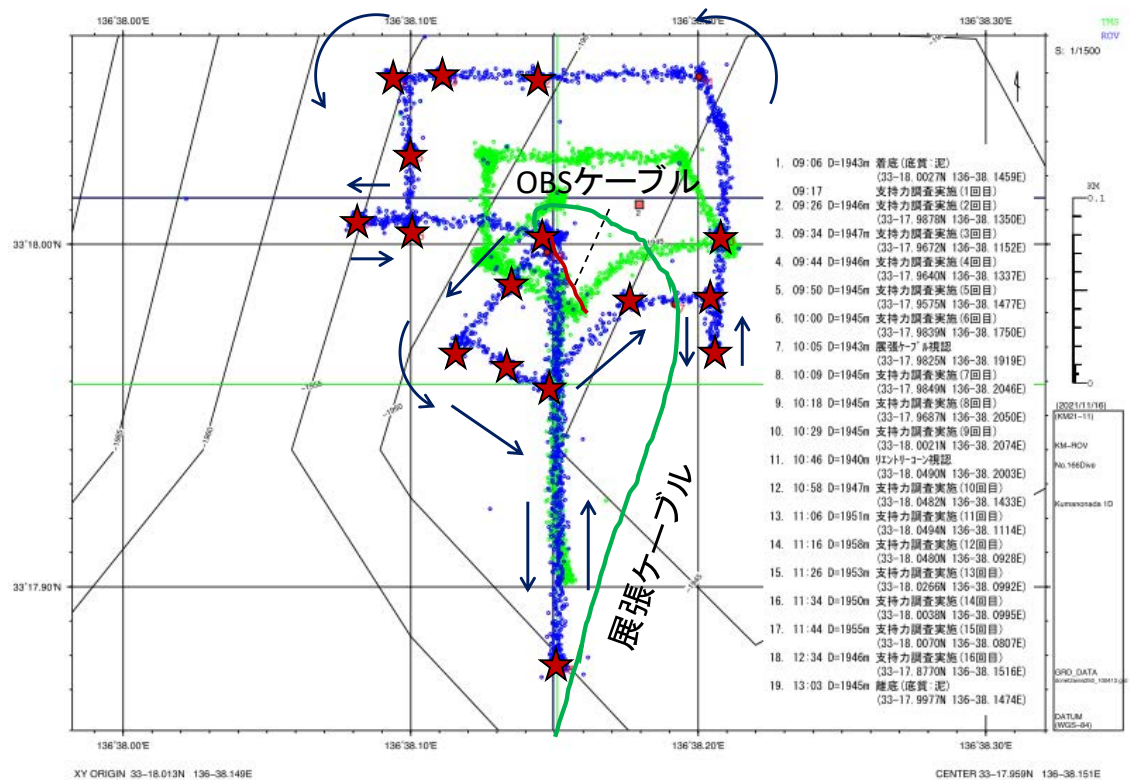


Fig. 10 KM-ROV dive track at C0002 site

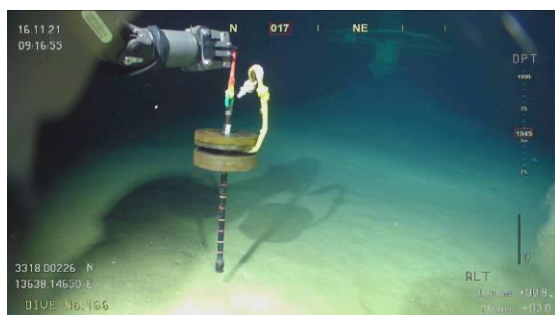


Fig 11. Photo taken at C0002 site

### 3.5 Route survey off Hatsushima Island

We are planning to install fiber optic cable for DAS measurement off Hatsushiam Island. Therefore, the route survey along the cable route was conducted. The survey was done during two days; the survey at the southern area was surveyed in the first day, and the northern area (i.e., near the Hatsushima observatory) was surveyed in the second day. Each dive track is provided in Fig. 12 and 13. We did not find any problems along the planned route cable.

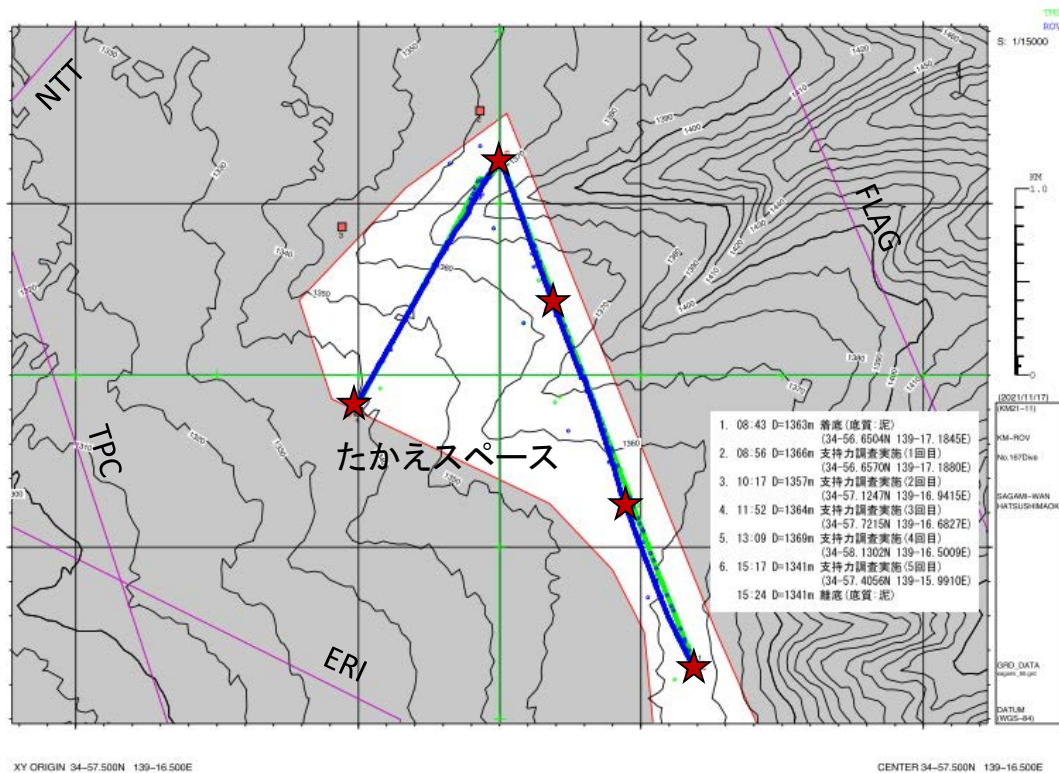


Fig. 12 KM-ROV dive track off Hatsushima

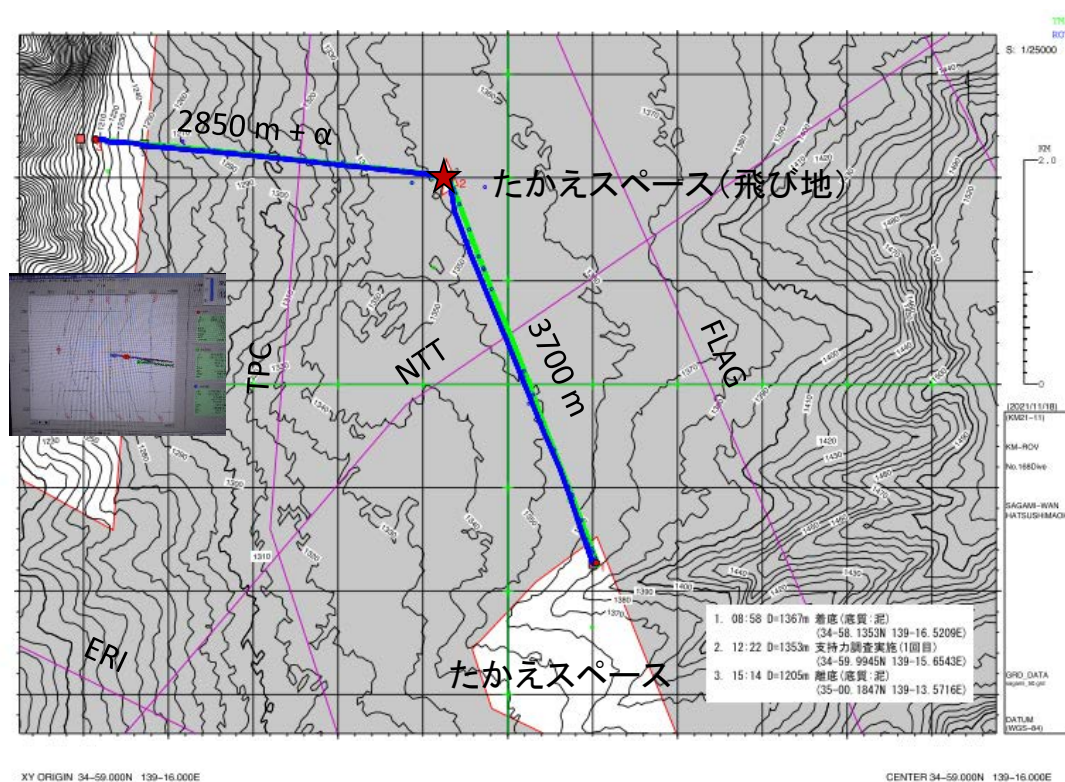


Fig. 12 KM-ROV dive track off Hatsushima

#### 4. Cruise Log

Cruise log is provided as follows.

| Date  | Ship log                | Area                 | Activities                   |
|-------|-------------------------|----------------------|------------------------------|
| 11/07 | Departure from Yokosuka |                      |                              |
| 11/08 | Diverted                | West of Shionomisaki |                              |
| 11/09 | Diverted                | East of Shionomisaki |                              |
| 11/10 | Diverted                | 1B-S1                |                              |
| 11/11 | Dive #160               | 1B-S1                | BMS backfilling              |
| 11/12 | Dive #161               | 1B-S1                | BMS backfilling              |
| 11/13 | Dive #162               | 1B-S1                | BMS backfilling              |
| 11/14 | Dive #164               | 1B-S1                | Observation near the station |
| 11/15 | Dive #165               | 2F-S2                | BMS site survey              |
| 11/16 | Dive #166               | C0002                | BMS site survey              |
| 11/17 | Dive #167               | off Hatsushima       | DAS route survey             |
| 11/18 | Dive #168               | off Hatsushima       | DAS route survey             |
| 11/19 | Arrived at Yokosuka     |                      |                              |

## 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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<http://www.godac.jamstec.go.jp/darwin/explain/1/e#report>

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