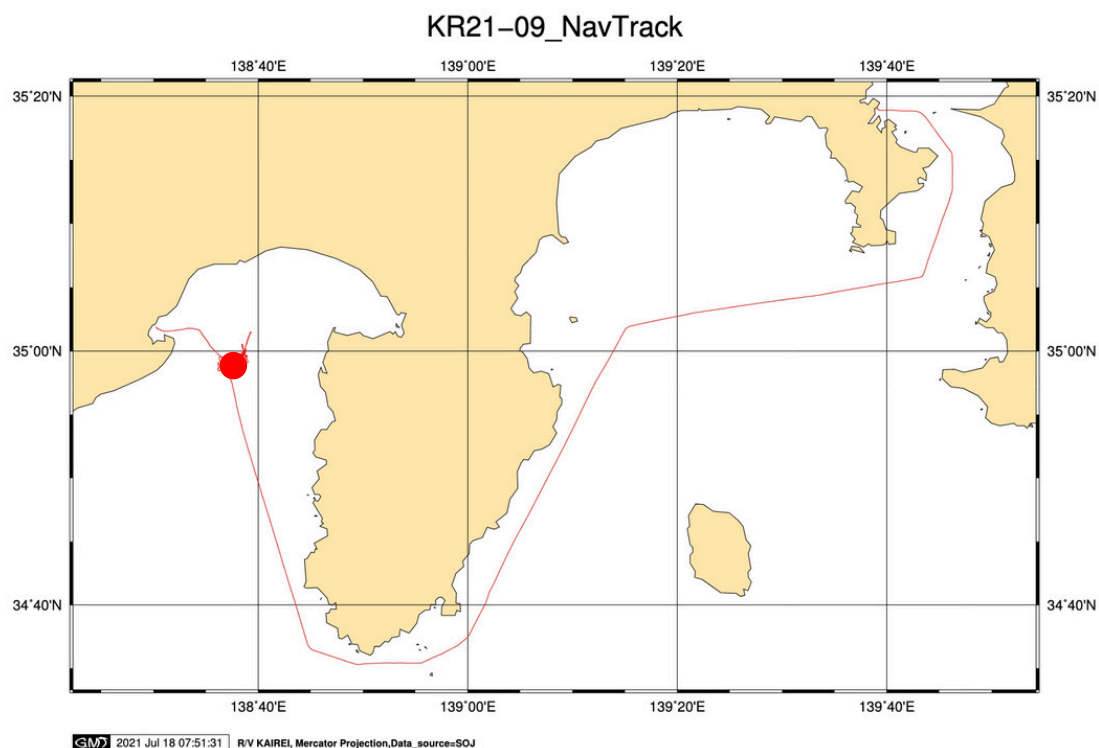


Submission date: August 17, 2021

## Cruise Summary

### 1. Cruise Information

- Cruise ID: KR21-09
- Name of vessel: Kairei
- Title of the cruise: Development of a research cruise program to raise awareness and interest of the younger generation towards the ocean
- Chief scientist: Takamasa Tamura [Public Relations Section, JAMSTEC]
- Cruise period: July 17 – July 18, 2021
- Ports of departure / arrival: JAMSTEC Yokosuka – Shimizu
- Research area: Suruga Bay
- Research map



## 2. Research/Development Activities

- Overview of the observation

Initially, the KR21-09 cruise was planned as a hands-on experience for elementary school students who won the "*Kaiyou no Yume Contest*" and their parents (six people in total) to board the R/V *KAIREI* to enjoy deep-sea exploration. However, due to the fact that the spread of the new coronavirus infection (COVID-19) has not been contained, the invitation of parents and children was cancelled. The original plan was changed to one that allows a wider range of people to experience the real deep-sea exploration of the ROV *KAIKO* online.

The specific projects that were implemented are as follows.

### **1. Real-time delivery of high quality VR images of the deep sea to a special venue at the Society 5.0 Expo**

During the YK21-04 cruise in March 2021, the Public Relations Section of JAMSTEC had succeeded in capturing beautiful 8K-quality VR images of the entire deep-sea exploration by the *SHINKAI6500*. In the KR21-09 cruise, we took on the challenge of distributing the beautiful and realistic VR images of the deep-sea exploration to the land in "real time" and through VR goggles, providing many visitors of the Society 5.0 Expo the ultimate immersive experience as if they were in the deep sea.

The biggest technical challenge was to secure a high-capacity and high-speed communication method from the research vessel to the land. After several months of deliberation, the "LiveU" system, which bundles the lines of multiple mobile carriers, was adopted for this project. Mr. Ogita (Public Relations Section, JAMSTEC), who is also the developer of the 8K VR camera, taking the lead, and with the precise and dedicated support of Mr. Ugajin (DWANGO Co., Ltd.), we succeeded in distributing VR images of deep-sea exploration in 4K quality in real time to the Society 5.0 special venue at *Tokyo SKYTREE TOWN*. I suspect that this is an unprecedented attempt not only in Japan but also in the world.

Unfortunately, the "Future Ocean Days" event at the special venue was not attended due to the COVID-19 pandemic, and only the panelists on the stage were able to experience the immersive deep-sea exploration in real time using high-definition VR (for elementary school students who won the "*Kaiyou no Yume Contest*" and their parents (six people in total) who were supposed to be aboard the ship, we opened a limited public YouTube page and provided them with a VR viewing kit in advance to watch the 4K-quality real-time video at home).

## **2. Live broadcasting of two-day documentary of the research cruise on niconico douga**

Apart from real-time delivery of high quality VR images (1.), the documentary of the two-day research cruise was broadcasted live for more than twenty-five hours in cooperation with *niconico douga*, one of Japan's largest video distribution services. Documentary included the departure of the research vessel, the image of *KAIREI* at sea, the professional work of crew members, meals on the ship, maintenance of the ROV, the setting sun seen from the research vessel, and footage of deep-sea exploration in *Suruga Bay*.

Navigators were Ms. Sayaka Harada from the idol group *STU48* (as a representative of younger viewers), Mr. Makoto Sugimura of the Enoshima Aquarium (as a commentator on biology), and Mr. Tetsuya Yokota of Nippon Marine Enterprises, Ltd. (as a commentator on technology), and their easy-to-understand and friendly commentary allowed more than 85,000 viewers to enjoy the entire research cruise in real time.

In the climax of the ROV *KAIKO* deep-sea exploration, for the first time, we succeeded in operating the ROV by responding interactively to viewer's requests, taking advantage of the comment function of *niconico douga*.) We were able to provide viewers who are restricted from going out due to the COVID-19 pandemic with the enjoyment of participating in deep-sea exploration from their homes.

The live broadcast of the research cruise documentary, which lasted more than twenty-five hours, was brilliantly directed by Mr. Yoshizawa (Public Relations Section, JAMSTEC) and Mr. Akimoto (DWANGO Co., Ltd.). The beautiful full HD images produced by the "LiveU" system, which was also used in 1. above, were very well received by the viewers. The deep-sea sea cucumbers (*Enypniastes eximia*) collected by the ROV *KAIKO* were displayed at the Enoshima Aquarium. This exhibit was a delight to many visitors.

## **3. Recording and photographing on board**

The highlight video of the research cruise by *R/V KAIREI* and *ROV KAIKO* was recorded by six excellent film crew members (Mr. Sugai, Mr. Ohki, Mr. Makabe, Mr. Kamijoh, Mr. Yazaki, and Mr. Hayashi). The video, which also features Ms. Yuuna Kawamata from the idol group *STU48*, will be released on YouTube within this year.