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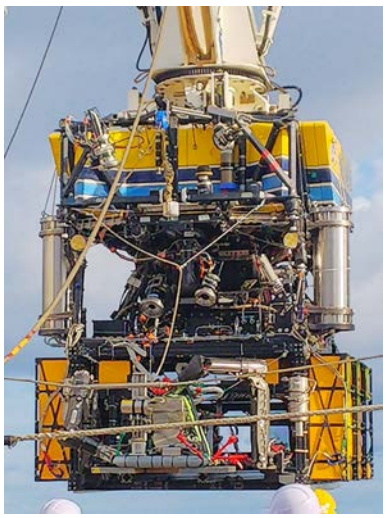
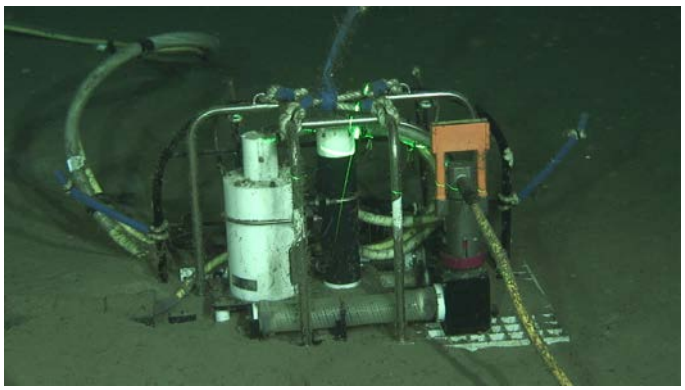
Shinseimaru+ “Cruise Report”
KS-20-J02





Real time ocean bottom crustal movement observation

Off Kii Suido and Kumanonada
Feb. 3rd, 2020 - Feb. 26th, 2020

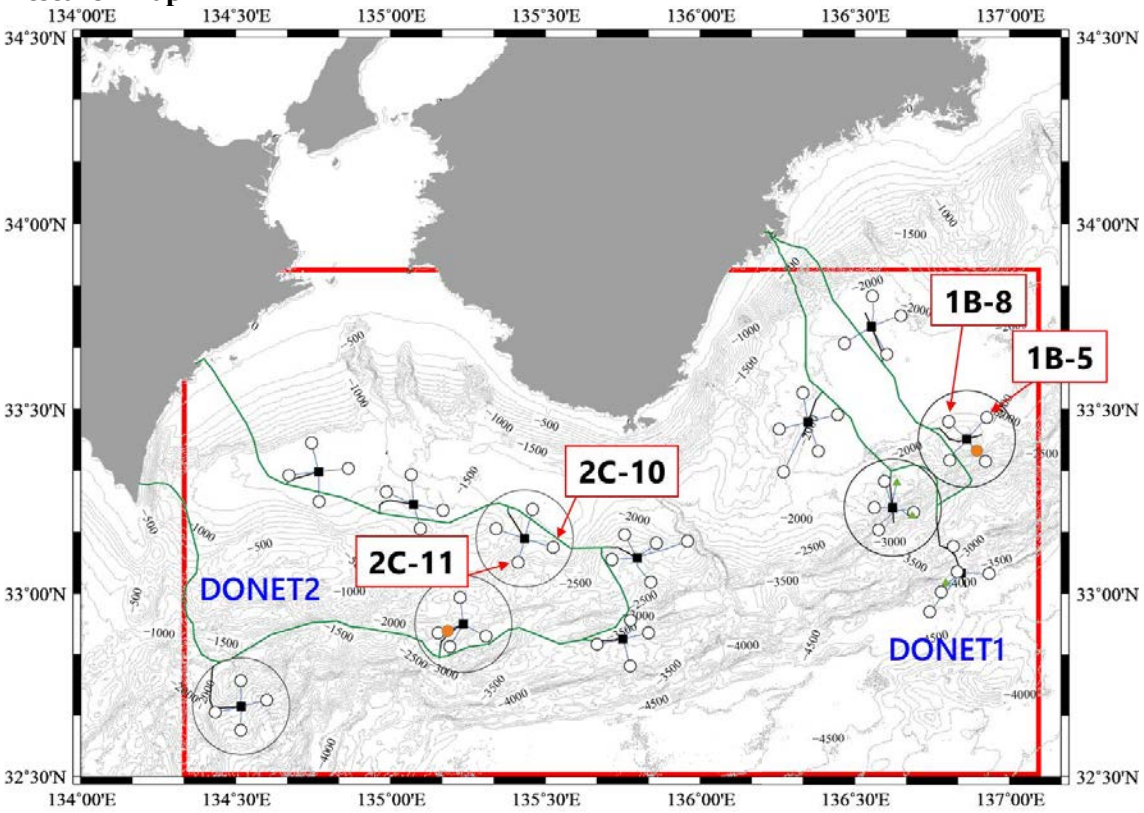
Ocean Floor Observatory Technology Development Group
R&D Center for Earthquake and Tsunami
Research Institute for Marine Geodynamics
Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

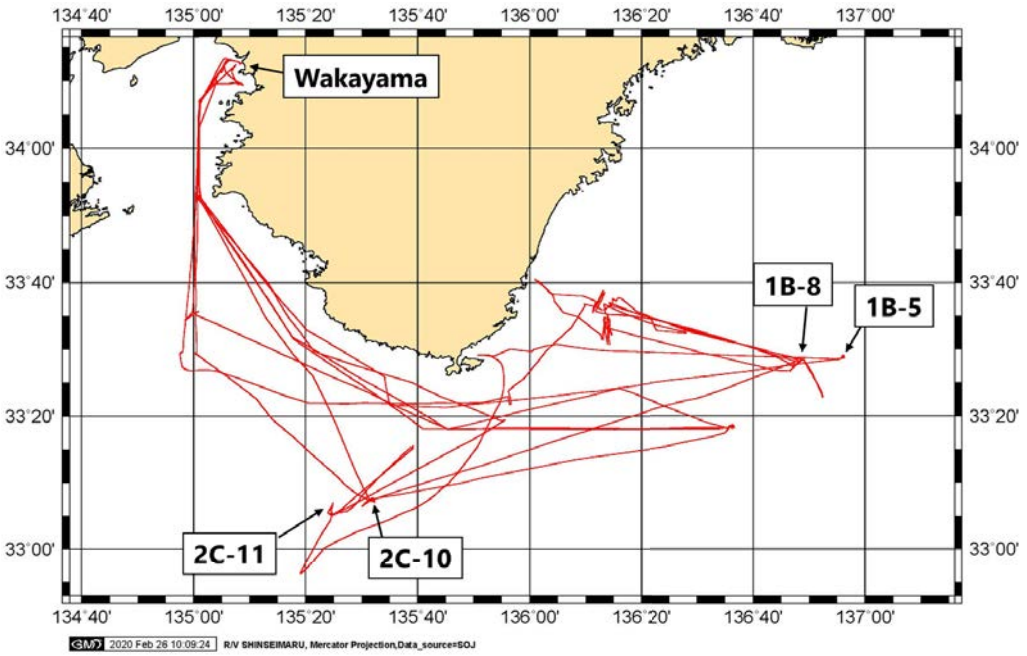
Contents

1. Cruise Information

Cruise ID:	KS-20-J02
Name of vessel:	Shinsei-maru
Title of cruise:	Real time ocean bottom crustal movement observation
Representative of the Science Party [Affiliation]	Shuichi Kodaira [JAMSTEC]
Chief Scientist [Affiliation]:	Shuhei Nishida [JAMSTEC]
Boarding Scientist	Yuya Machida [JAMSTEC] (Feb.3rd-10th) Ryo Kimura [Nihon Marine Enterprise] Morifumi Takaesu [Nihon Marine Enterprise] (Feb.11st-19th) Taro Shirai [Nihon Marine Enterprise] Masayuki Toizumi [Nihon Marine Enterprise] (Feb.20th-26th) Matthew James Cook [JAMSTEC] Keita Suzuki [Nihon Marine Enterprise] Toshimasa Nasu [Nihon Marine Enterprise]
Cruise period:	February 3rd, 2020 - February 26th, 2020
Ports of departure / call / arrival:	Wakayama Port / Wakayama Port / Wakayama Port
Research area:	off Kii-suido, Kumano-nada

Research map





2. Research Proposal

JAMSTEC has been implementing the "Observation Project on the wide area variation of the ocean floor for building national resilience" since FY2017 in order to achieve the national mission of toughening the national land, securing people's safety and security. In this project, (1) development and deployment of ocean bottom crustal deformation observation technology based on the submarine cabled observation and monitoring system for earthquake and tsunami (DONET), using a pressure gauge, an inclinometer, a long-term borehole observation system installed in a borehole of "CHIKYU" deployed in the Nankai Trough. (2) High precision wide area survey of active submarine faults using a three-dimensional seismic survey system of the ocean floor wide area research ship "KAIMEI" and etc., in Nankai Trough segment area, which is important for the evaluation of interactivity, and the Japan Trench outer rise area that may cause a tsunami earthquake. (3) Development and evaluation of more realistic simulation and transition prediction methods incorporating new survey and observation results obtained in (1) and (2) will be conducted. Through this, the prediction of the occurrence of huge earthquakes (Evaluation of urgency, scale and distribution) was imploded. In addition, the accuracy of tsunami inundation immediate prediction is improved by accurately estimating the epicenter area, its size, and the tsunami source immediately after the earthquake occurrence. The purpose is to realize disaster prevention and mitigation through these efforts.

3. Activities and Results

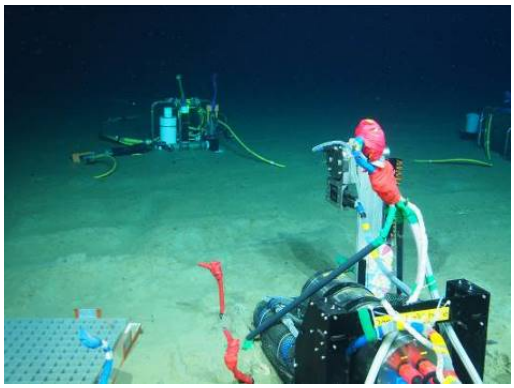
The purpose of this research is the real time sea floor observation for crustal deformation based on submarine cabled monitoring system for the earthquake and tsunami (DONET) deployed in the Nankai Trough using various sensors, such as pressure gauges, inclinometers and borehole observation system.

In this expedition KS-20-J02, in-situ calibration was carried out with the mobile pressure calibrator.

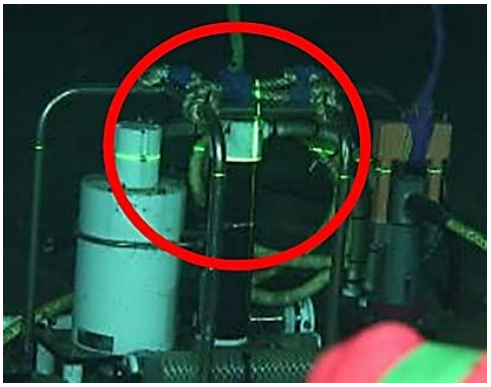
(1) IN-SITU CALIBRATION

The measurement was done at 1B-5, 1B-8, 2C-10 and 2C-11. Figure 4-1 shows the pictures taken before diving. The payloads were mounted in front of the ROV Hyper Dolphin shown in picture 4-1 (a) and (b). Figure 4-2 shows pictures taken during the measurement. In Fig.4-2 (a), the pressure gauge of DONET was shown on the upper left, and the mobile pressure calibrator was shown in the lower right. In this measurement, the calibrator was installed the position where the distance between them is about 2.5 m. As shown in Fig.4-2 (b), the laser was irradiated to the black and white boundary of the cylinder in the pressure gauge, and the level was measured. At the same time, by subtracting the pressure corresponding to the difference of level from the pressure measured by the mobile pressure calibrator, the desired value of DONET pressure gauge can be obtained.

Fig.4-1 the Mobile Pressure Calibrator with the ROV Hyper Dolphin



(a) Mobile Pressure Calibrator (bootm right) and DONET Pressure Sensor (top left) on seafloor

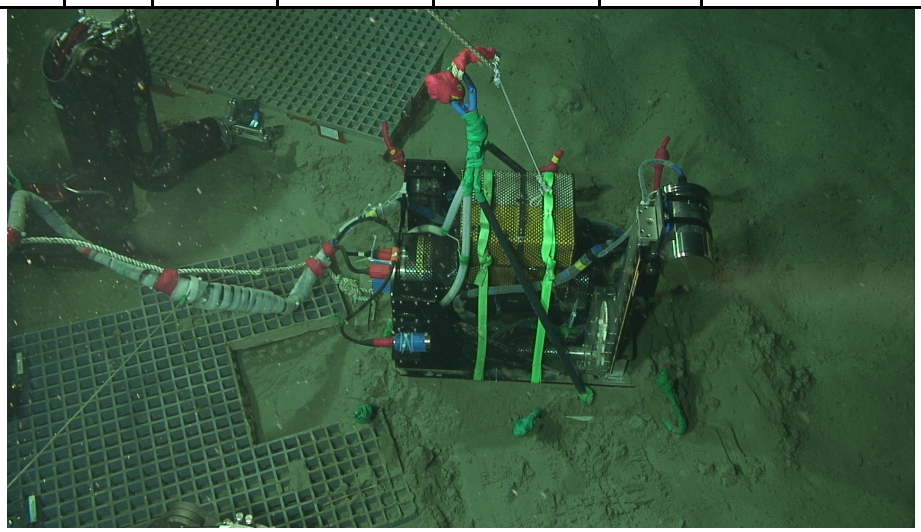


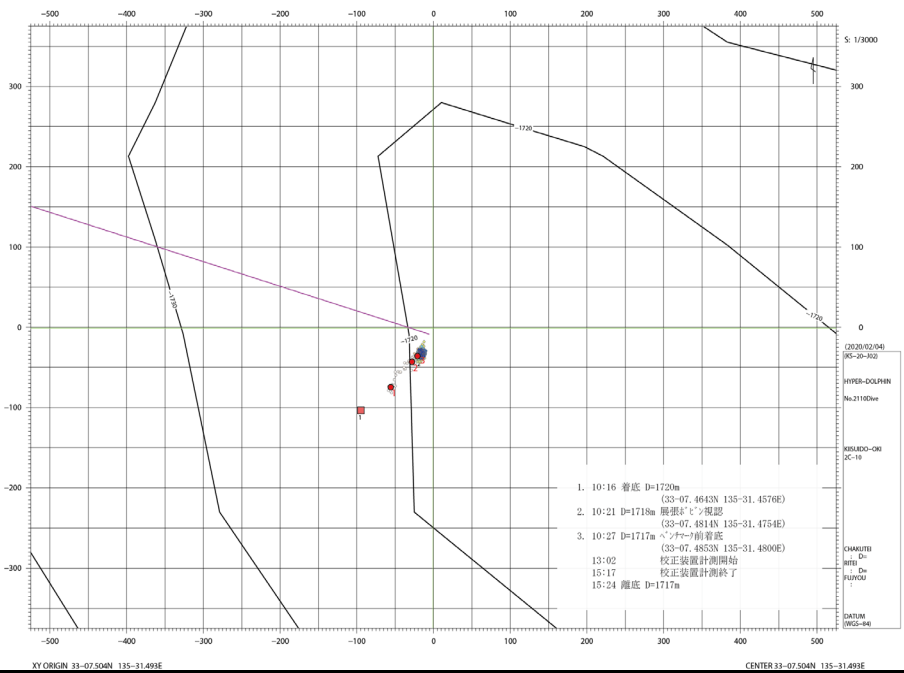
(b) Laser projected on DONET pressure gauge

Fig.4-2 Overview of in-situ pressure calibration operation

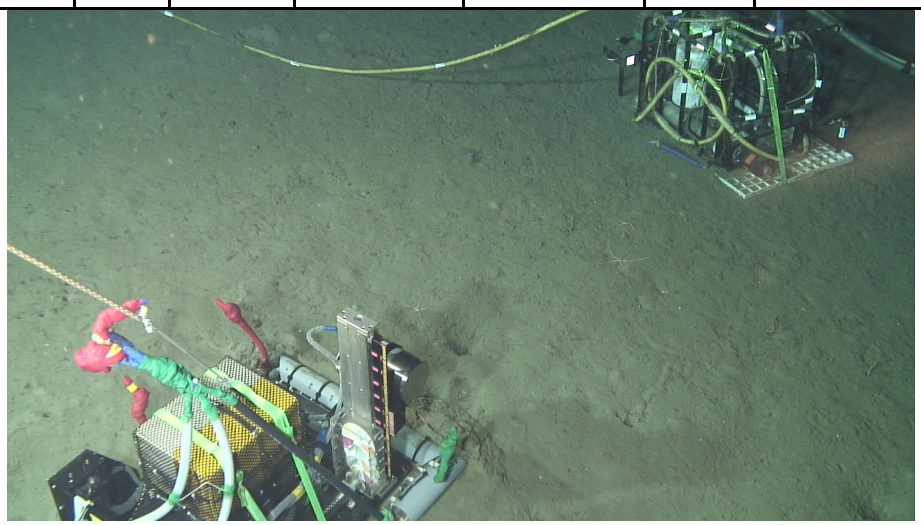
4. Dive Information of ROV Hyper Dolphin

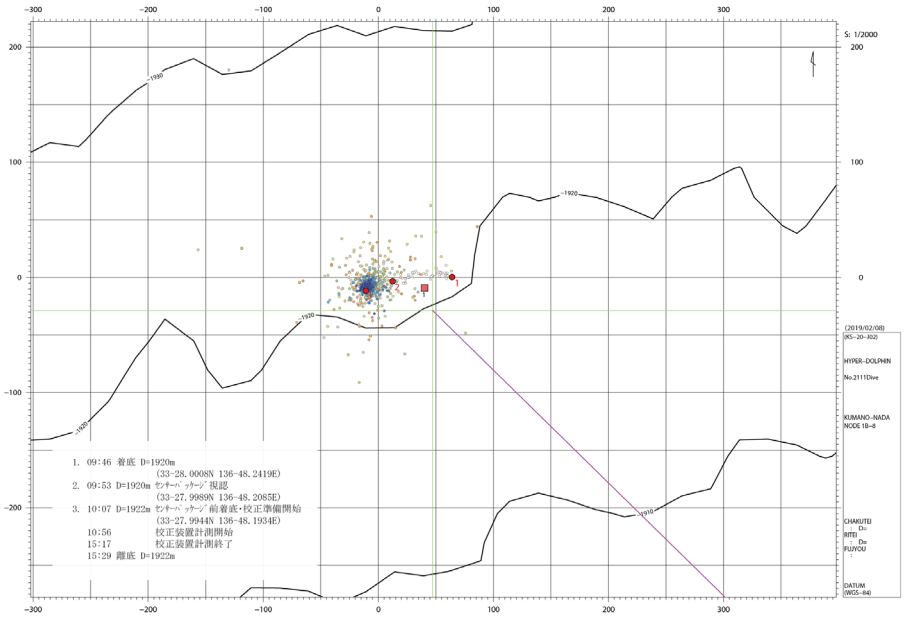
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
01	HPD#2110 2020/02/04	2C-10	10:16	33-07.4643N	135-31.4576E	1,720m	In-Situ Calibration for DONET 2C-10 pressure gauge was carried out using the mobile pressure calibrator.
			15:24	33-07.4853N	135-31.4800E	1,717m	



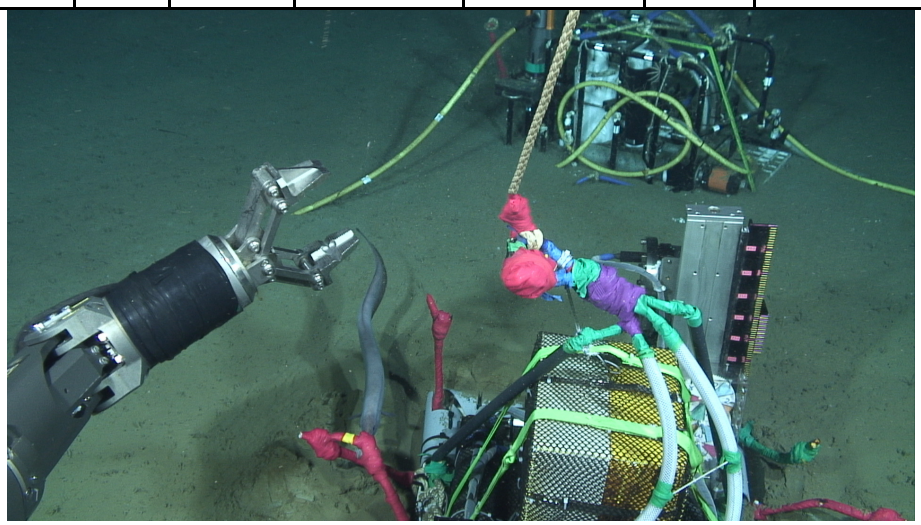


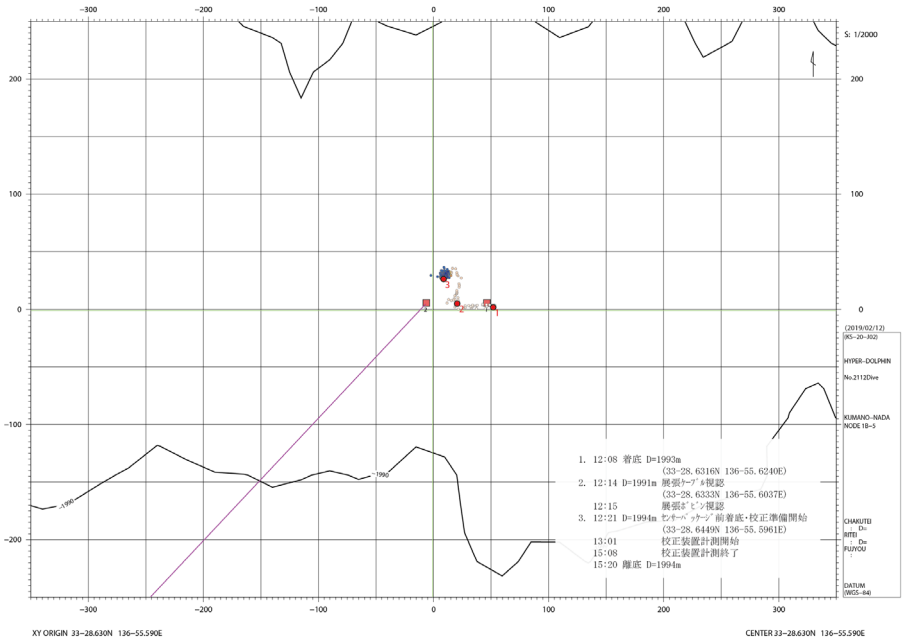
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
02	HPD#2111 2020/02/08	1B-8	09:46	33-28.0008N	136-48.2419E	1,920m	In-Situ Calibration for DONET 1B-8 pressure gauge was carried out using the mobile pressure calibrator.
			15:29	33-27.9944N	136-48.1934E	1,922m	



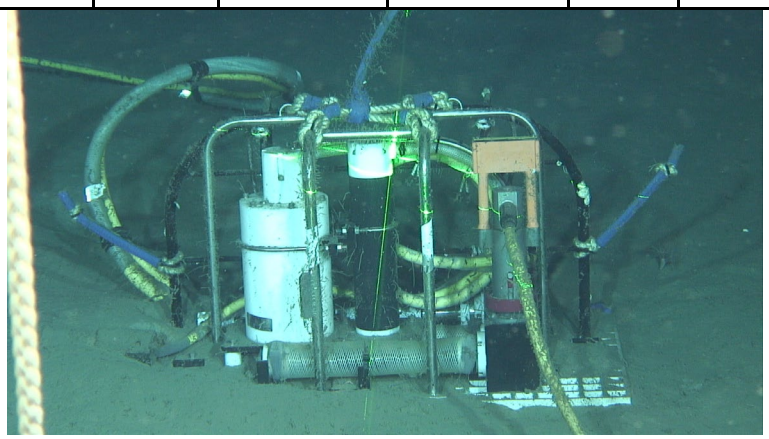


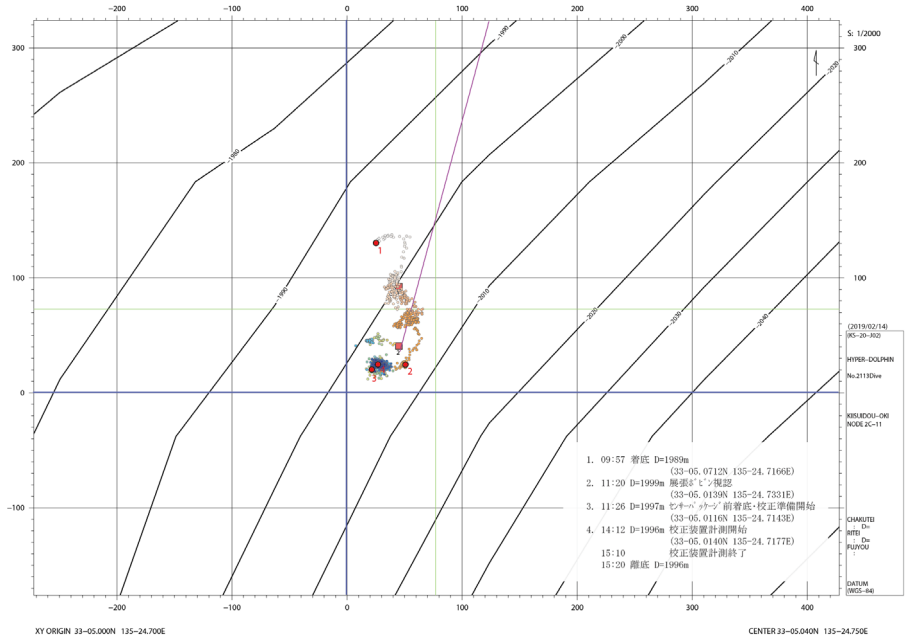
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
03	HPD#2112 2020/02/12	1B-5	12:08	33-28.6316N	136-55.6240E	1,993m	In-Situ Calibration for DONET 1B-5 pressure gauge was carried out using the mobile pressure calibrator.
			15:20	33-28.6449N	136-55.5961E	1,994m	





No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
04	HPD#2113 2020/02/14	2C-11	09:57	33-05.0712N	135-24.7166E	1,989m	In-Situ Calibration for DONET 2C-11 pressure gauge was carried out using the mobile pressure calibrator.
			15:20	33-05.0140N	135-24.7177E	1,996m	





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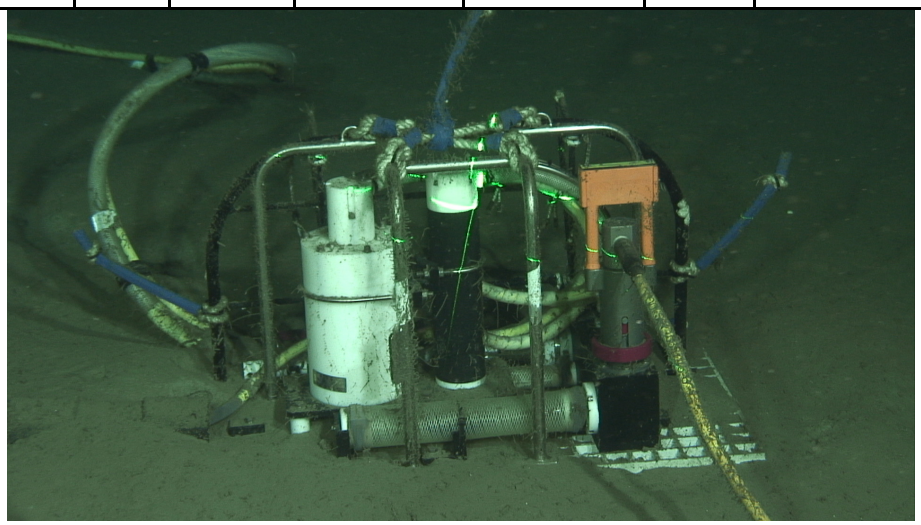
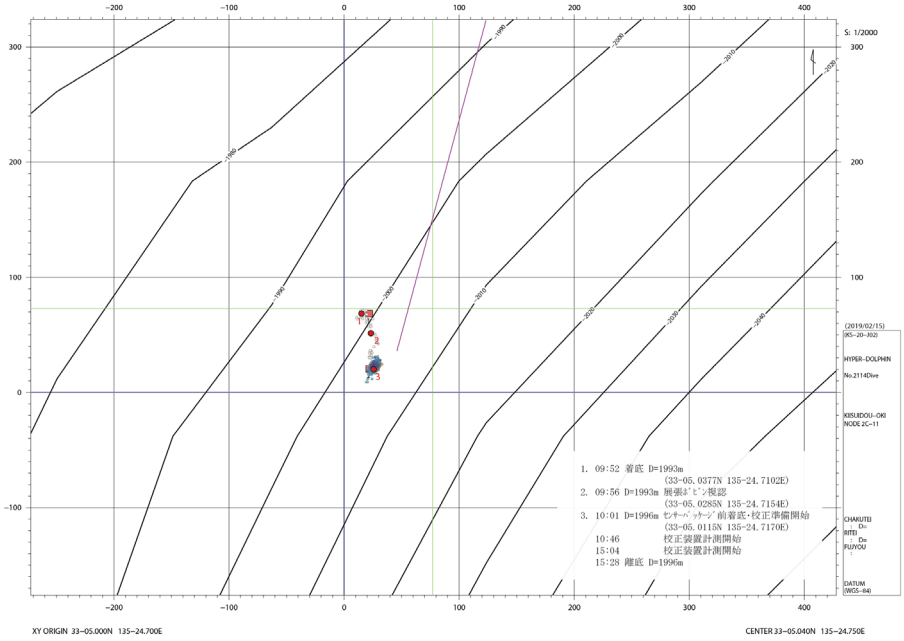
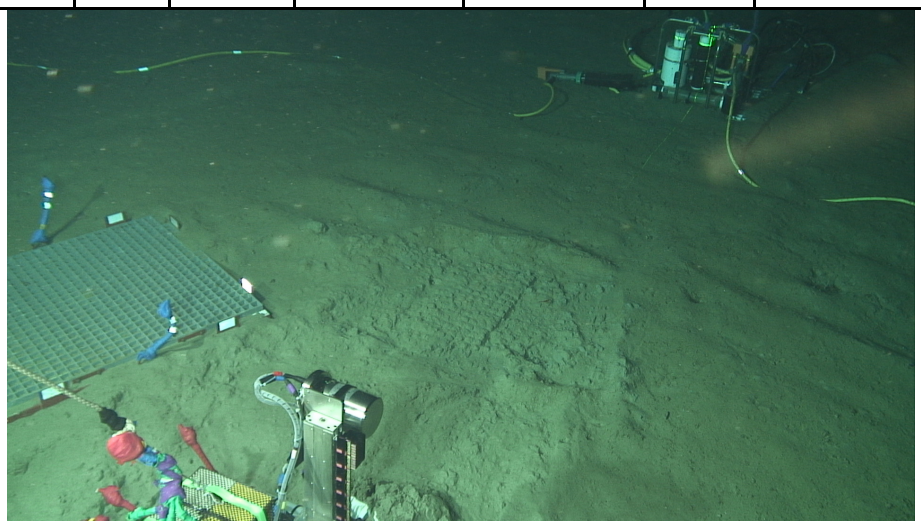
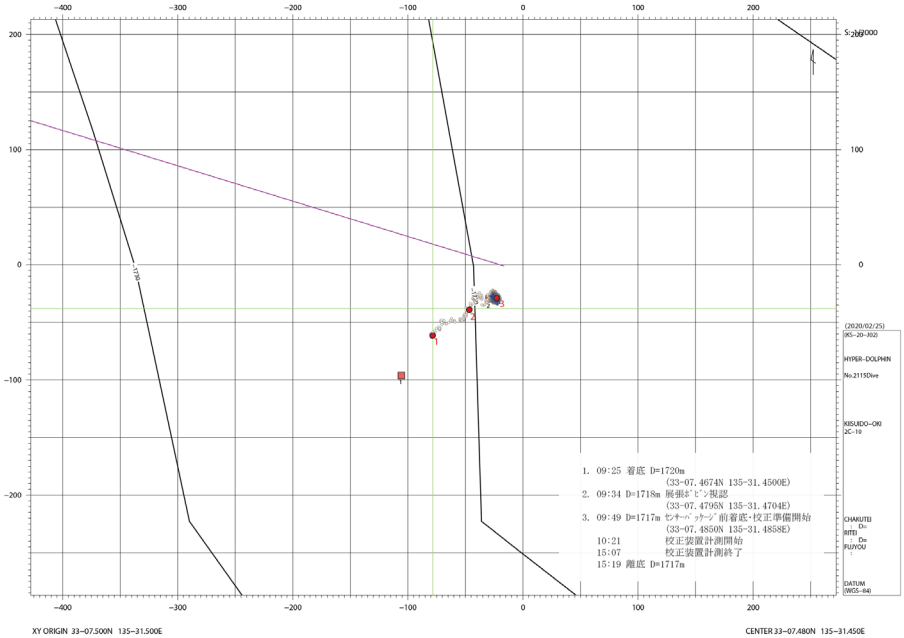
05	HPD#2114 2020/02/15	2C-11	09:52	33-05.0377N	135-24.7102E	1,993m	In-Situ Calibration for DONET 2C-11 pressure gauge was carried out using the mobile pressure calibrator.
			15:28	33-05.0115N	135-24.7170E	1,996m	





No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
06	HPD#2115 2020/02/25	2C-10	09:25	33-07.4674N	135-31.4500E	1,720m	In-Situ Calibration for DONET 2C-10 pressure gauge was carried out using the mobile pressure calibrator.
			15:19	33-07.4850N	135-31.4858E	1,717m	





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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