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Shinseimaru Cruise Report
KS-19-J02

Development of real time ocean bottom crustal deformation observation system

Off Kiisuido and Kumanonada

Feb.4th,2019 – Feb.13th,2019

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

1. Cruise Information

● Cruise ID: KS-19-J02

● Name of vessel: Shinsei-maru

● Title of cruise: Development of real time ocean bottom crustal deformation observation system

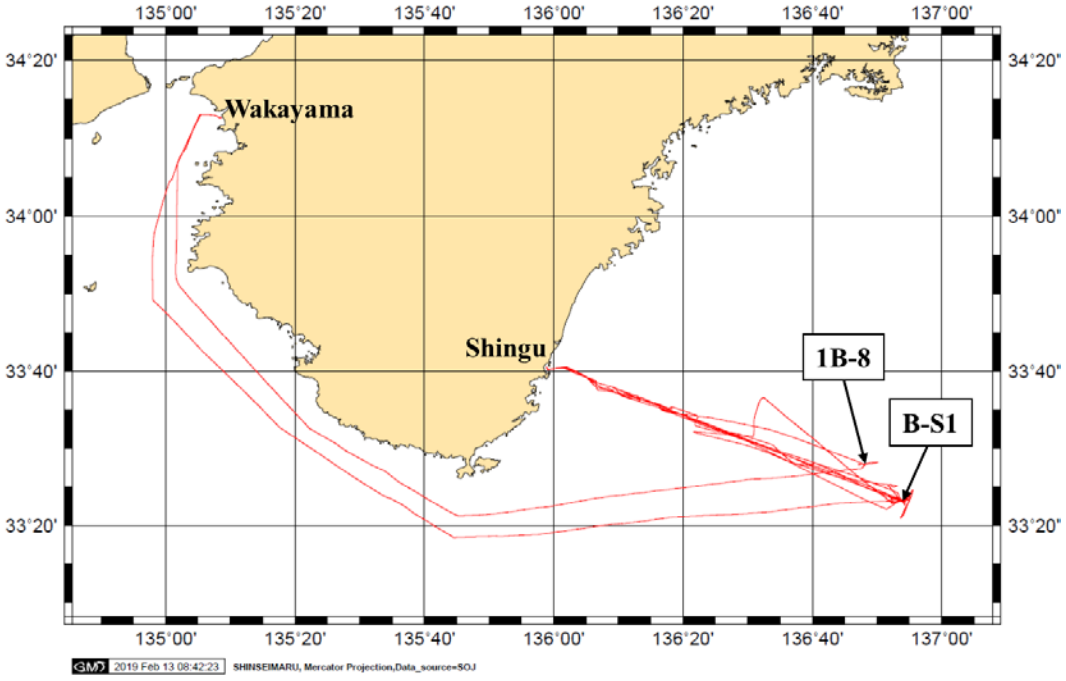
● Chief Scientist [Affiliation]: Shuhei Nishida [JAMSTEC]

● Cruise period: Feb.4th,2019 – Feb.13th,2019

●Ports of departure / arrival: Wakayama / Wakayama

● Research area: off Kii-suido and Kumano-nada

○ Research map



2. Research Proposal and Science Party

● Title of proposal

Development of real time ocean bottom crustal deformation observation system

● Representative of Science Party [Affiliation]

Shuichi Kodaira [JAMSTEC]

● Science Party (List) [Affiliation, assignment etc.]

Shuhei Nishida [JAMSTEC]
Takshi Yokobiki [JAMSTEC]
Toshinori Kimura [JAMSTEC]
Yuya Machida [JAMSTEC]

3. Overview of Research Activities

① Purpose

JAMSTEC has been implementing the "Observation Project on wide area variation of 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 three-dimensional seismic survey system of the ocean floor wide area research ship "KAIMEI" and etc., at 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.

② Activities

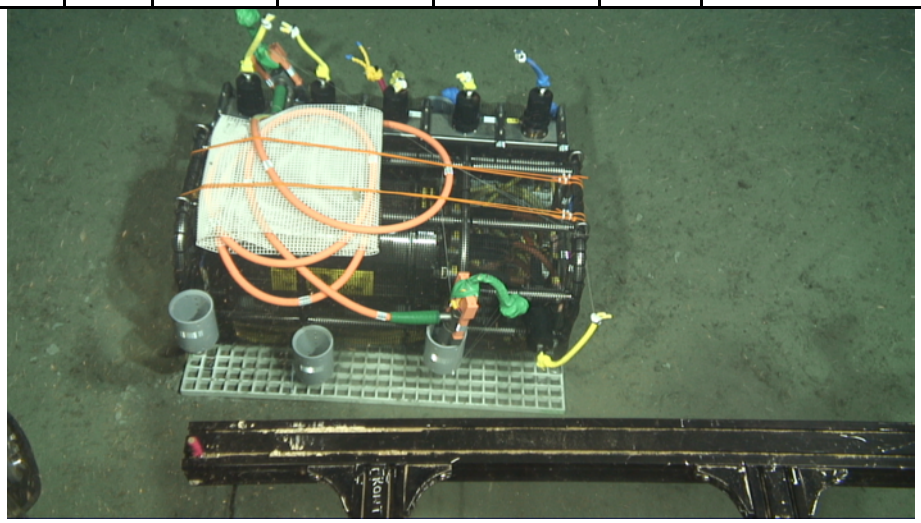
As a development and development of continuous real-time seafloor crustal movement observation technology with water pressure gauge, tiltmeter, strain gauge, etc. based on the earthquake and tsunami observation and monitoring system (DONET) deployed in the Nankai Trough, DONET water pressure in this cruise We performed on-site calibration of the gauge, installation of the inclinometer, and connection to DONET.

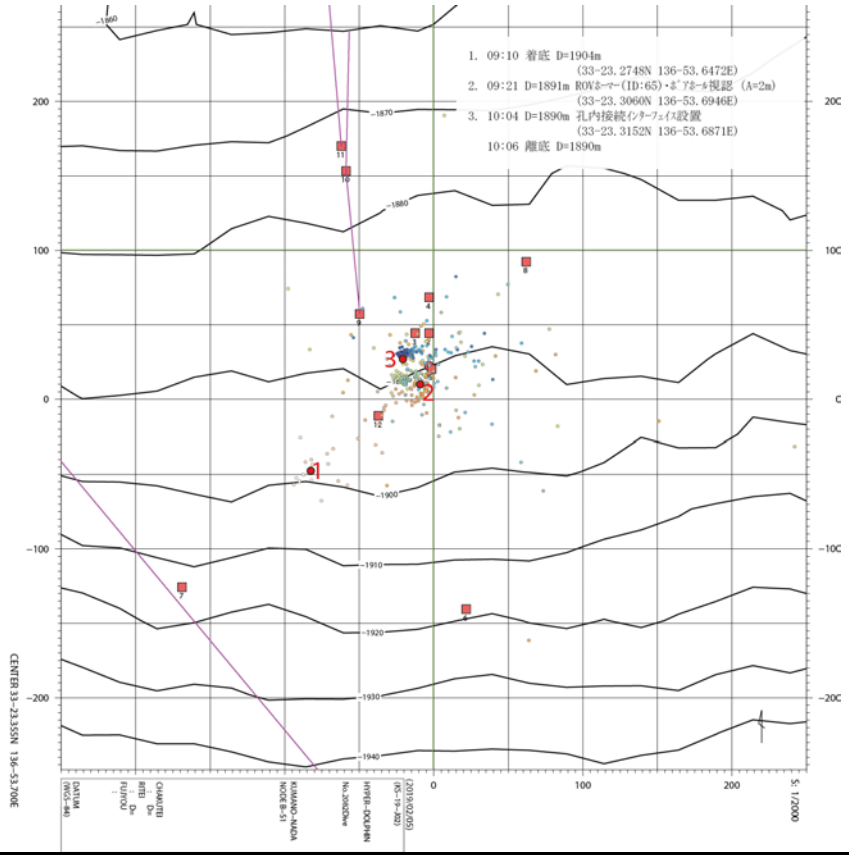
③ Results

A DONET I/F device was installed on B-S1 and connected with the DONET backbone cable system. And a tilt meter was installed in the drilled hole at the same site and connected with the DONET connection I/F. And then, the health check was carried from the land station. In addition, at DONET station 1B-8, a mobile pressure calibrator was put at about 2.5m from the DONET pressure gauge, and measurement of the level difference of the DONET pressure gauge and precise pressure measurement were performed.

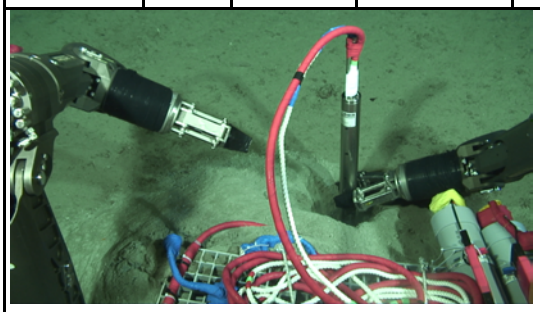
4. Dive Information

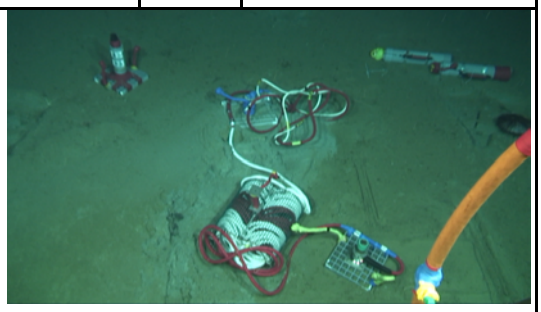
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
01	HPD#2082 2019/02/05	B-S1	09:10 10:06	33-23.2748N 33-23.3152N	136-53.6472E 136-53.6871E	1,904m 1,890m	The DONET I/F was installed 20 m north from the ROV HOMER (ID: 66) near the BMS borehole.

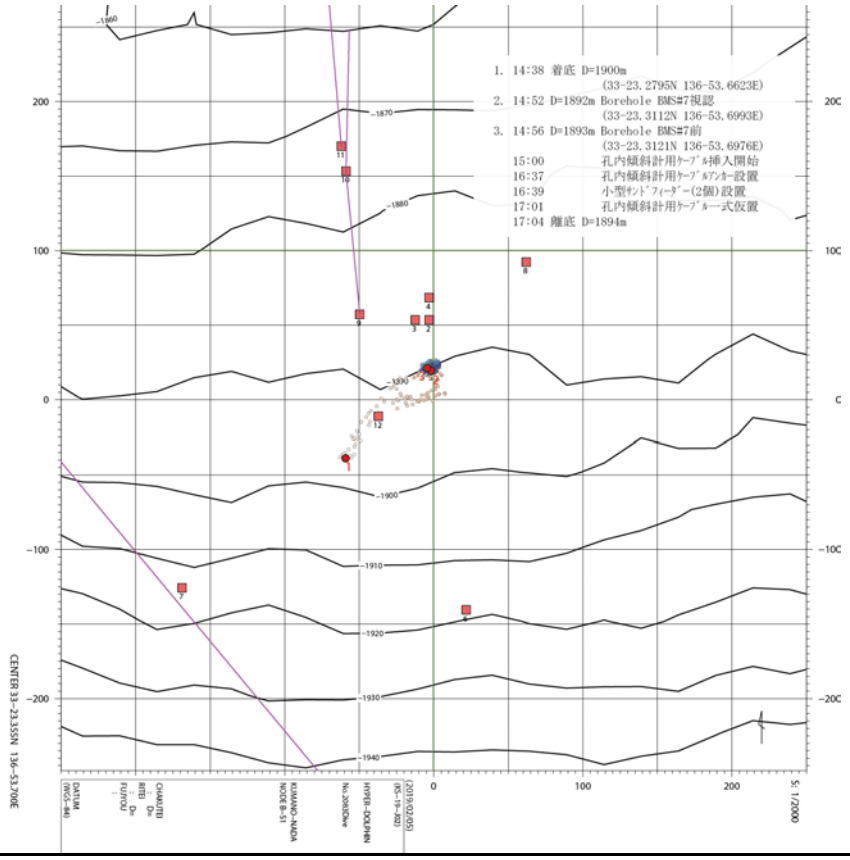




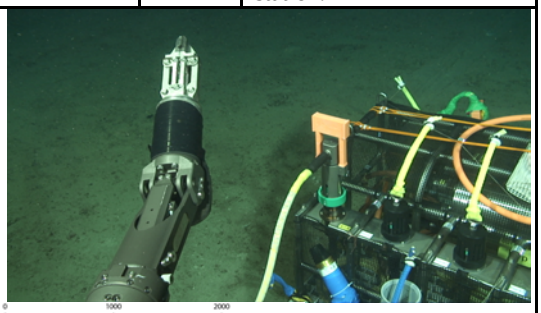
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
02	HPD#2084 2019/02/05	B-S1	14:38 17:04	33-23.2795N 33-07.4881N	136-53.6623E 135-31.4824E	1,900m 1,717m	A tilt meter was installed in the BMS borehole at B-S1.

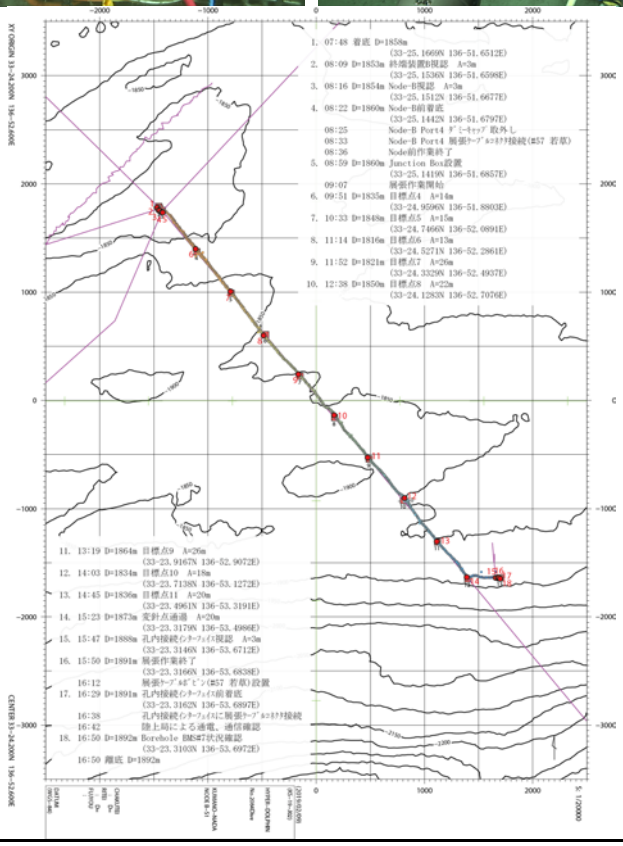




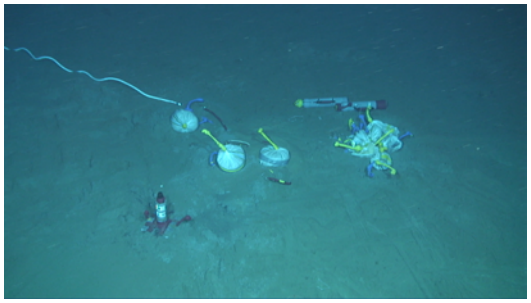


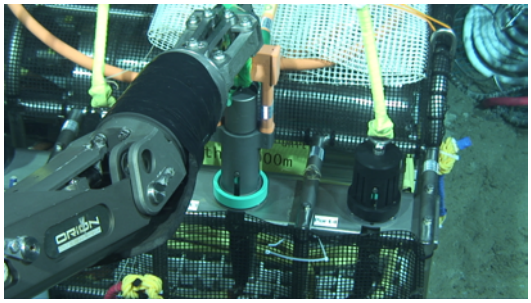
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
03	HPD#2084 2019/02/09	B-S1	07:48 16:50	33-25.1669N 33-23.3103N	136-51.6512E 136-53.6972E	1,858m 1,892m	An extension cable was installed from DONET Node1B to B-S1 and connected. And then, the healthiness of the observation system was confirmed from the land station.

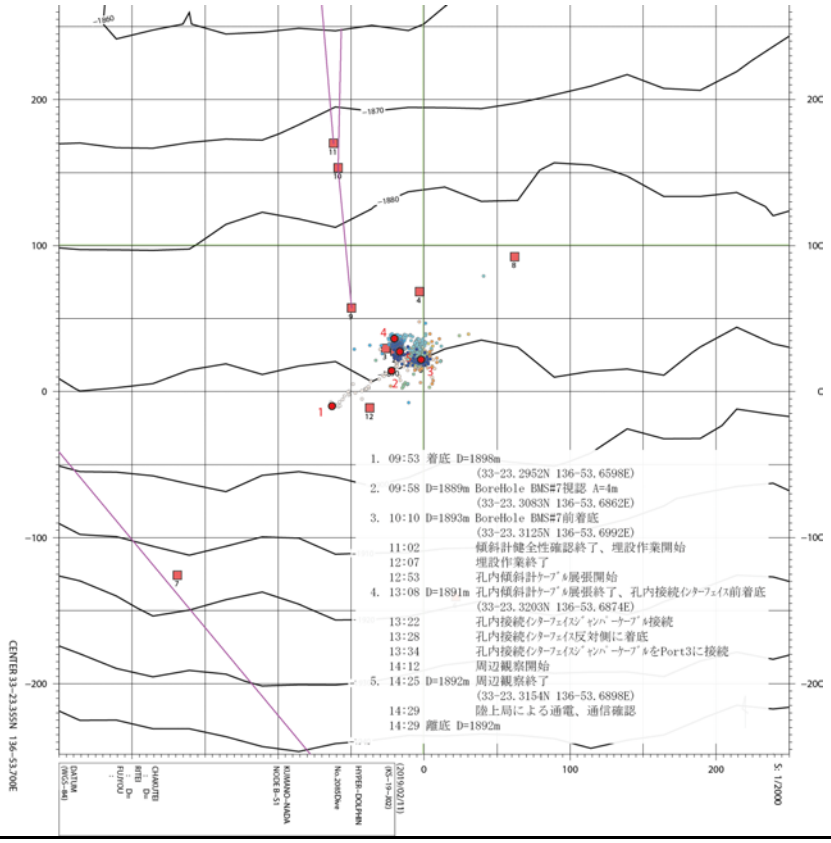




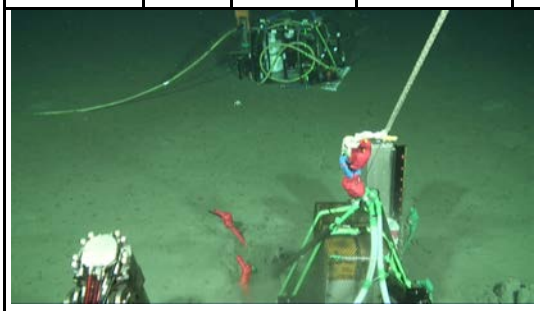
No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
04	HPD#2085 2018/02/11	B-S1	09:35 14:29	33-23.2952N 33-23.3154N	136-53.6598E 136-53.6898E	1,898m 1,892m	The inclinometer installed in the borehole was buried in sand. After that, the connecting cable of the tilt meter was expanded, and the cable was connected to the DONET I/F.

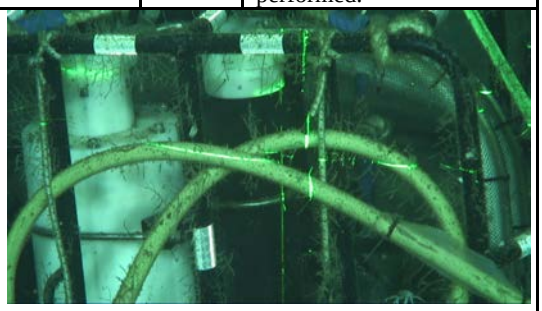


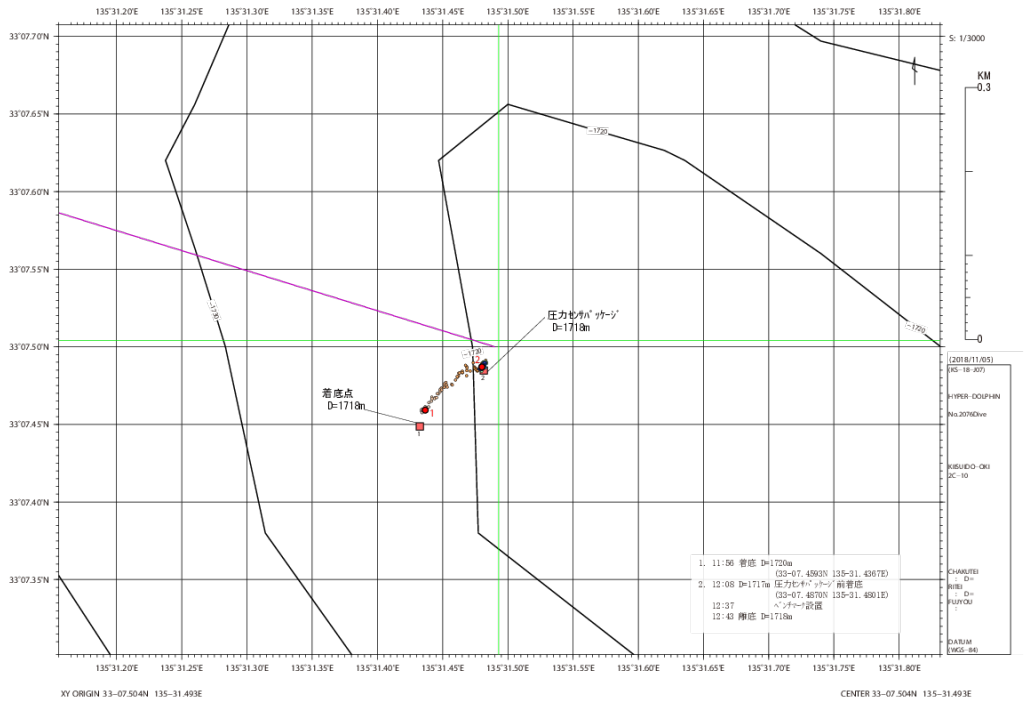




No.	Dive Num. Date	Dive Point	Arrival Time Departure Time	Latitude Latitude	Longitude Longitude	Depth Depth	Work Summary
05	HPD#2086 2019/02/12	1B-8	10:54 17:31	33-27.9908N 33-27.9972N	136-48.2291E 136-48.1920E	1,920m 1,920m	At DONET station 1B-8, a mobile pressure calibrator was put at about 2.5m from the DONET pressure gauge, and measurement of the level difference of the DONET pressure gauge and precise pressure measurement were performed.







● 5. Notice on Using

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