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KAIREI Cruise Report
KR19-02C

2018FY “Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region”

Ryukyu Arc

Feb. 1, 2019 - Feb.12, 2019

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

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1. Cruise Information

● Cruise ID
KR19-02C

● Name of vessel
R/V KAIREI

● Title of project:
Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region

● Title of cruise
2018FY “Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region”

● Chief Scientist [Affiliation]
Tsutomu Takahashi [JAMSTEC]

● Cruise period
Feb. 1, 2019 – Feb. 12, 2019

● Ports of departure / call / arrival
Departure: Kochi port / Arrival: Yokosuka port (JAMSTEC)

● Research area
Ryukyu arc

● Research map

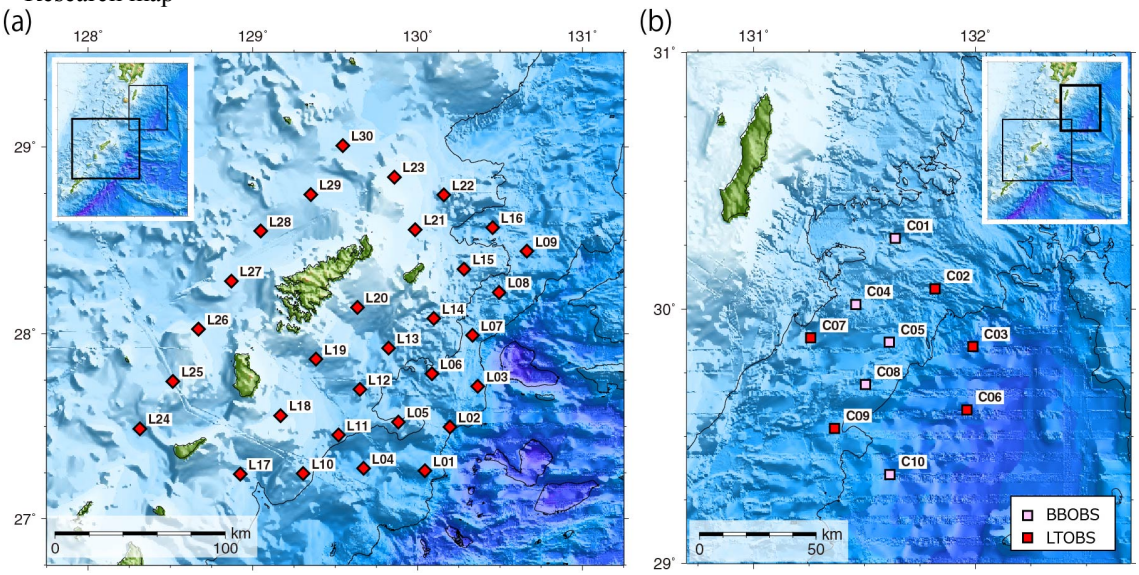

Fig. 1. Positions of (a) deployed short-period OBSs, and (b) broadband OBSs (BBOBSs) and long-term OBSs (LTOBSs).

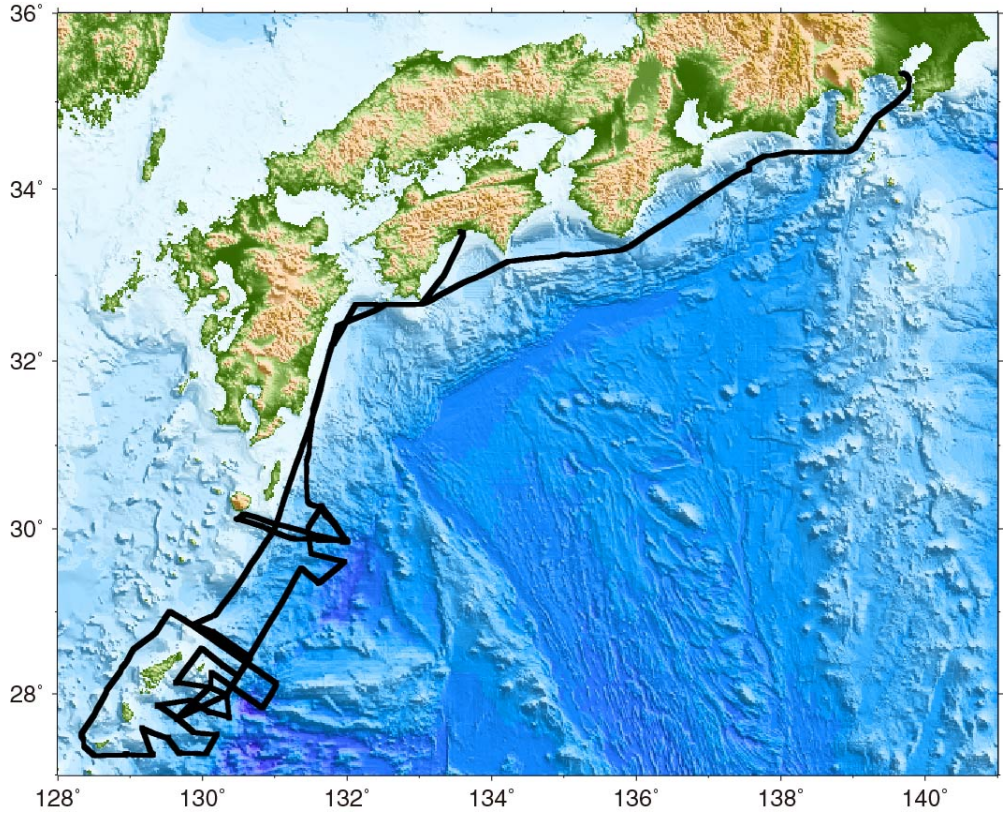

Fig.2. Ship track during KR19-02C cruise

2. Research Proposal and Science Party

● Title of proposal

Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region

● Representative of Science Party [Affiliation]

Shuichi Kodaira [JAMSTEC]

● Science Party (List) [Affiliation]

Shuichi Kodaira [JAMSTEC]
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Gou Fujie [JAMSTEC]
Ayako Nakanishi [JAMSTEC]
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3. Research/Development Activities

3.1 Background and objectives

In Ryukyu subduction zone, permanent seismic observatories are deployed only on islands, and therefore island distribution causes a significant restriction of estimations of seismicity and underground structures. To elucidate details of seismicity, slow-earthquake activity, lithospheric structures, and plate geometry of this subduction zone, we conduct a series of passive and active seismic surveys around Ryukyu arc, as a part of research project "Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region" funded by Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.

In 2018FY, we conduct two passive seismic observations with Ocean Bottom Seismometers (OBSs). One is a broadband seismic observation at northern Ryukyu arc, and another is a seismic observation with short-period OBSs around Amami archipelago. The northern Ryukyu area shows high activity of slow-earthquakes, such as low frequency tremors (e.g., Yamashita et al. 2015) and slow slip events (e.g., Nishimura, 2014). We had deployed 5 broadband OBSs (BBOBSs) and 5 long-term OBSs (LTOBSs) off east coast of Tanega-shima during YK18-13C cruise for a near-field observation of slow earthquakes. In this KR19-02C cruise, we deployed 30 short-period OBSs around Amami archipelago, and calibrated settled positions of the OBSs, BBOBSs and LTOBSs.

3.2 OBS deployment and positioning

We deployed 30 short-period OBS (TOBS-24N, Tokyo-Sokushin Co.) around Amami archipelago. Settled positions of all these OBSs were measured by SSBL. We also checked a recording status of Long-Term OBSs (LTOBS) and Broadband OBSs (BBOBS) off east coast of Tanega-shima, and calibrated their settled positions by acoustic ranging at three different positions. At C03 (see Fig. 1), we could not calibrate its settled position because of no acoustic response from its transponder. These LTOBSs and BBOBSs have been deployed during YK18-13C cruise. LTOBS is equipped with the 1Hz seismometer (LE3D/lite, Lennartz electronic) or a 120s seismometer (Trillium Compact 120, Nanometrics). A BBOBS system is composed of a three-component broadband seismometer (CMG-3T, Guralp Systems) and a differential pressure gauge.

Site	North Latitude		East Longitude		Depth (m)	Instrument
	deg	min	deg	min		
L01	27	15.6393	130	2.6733	3296	OBS (short-period)
L02	27	29.8492	130	11.7517	3843	OBS (short-period)
L03	27	43.0050	130	21.9736	3519	OBS (short-period)
L04	27	16.4043	129	40.3894	2754	OBS (short-period)
L05	27	31.4309	129	53.0695	2013	OBS (short-period)
L06	27	47.0303	130	5.1947	1904	OBS (short-period)
L07	27	59.4883	130	20.0143	2626	OBS (short-period)
L08	28	13.3196	130	29.6860	2355	OBS (short-period)
L09	28	26.5237	130	39.7879	2549	OBS (short-period)
L10	27	14.7557	129	18.3014	1610	OBS (short-period)
L11	27	27.2554	129	31.1792	1730	OBS (short-period)

L12	27	42.0449	129	39.0225	1706	OBS (short-period)
L13	27	55.3258	129	49.4806	1688	OBS (short-period)
L14	28	4.8901	130	5.9665	1249	OBS (short-period)
L15	28	20.8189	130	16.8329	1547	OBS (short-period)
L16	28	34.1321	130	27.2717	2647	OBS (short-period)
L17	27	14.6060	128	55.4645	1178	OBS (short-period)
L18	27	33.5587	129	10.1614	584	OBS (short-period)
L19	27	51.7608	129	22.9834	883	OBS (short-period)
L20	28	8.4796	129	38.1693	568	OBS (short-period)
L21	28	33.4890	129	59.1687	587	OBS (short-period)
L22	28	44.6214	130	9.5398	1105	OBS (short-period)
L23	28	50.3031	129	51.5671	199	OBS (short-period)
L24	27	29.2992	128	18.8351	1034	OBS (short-period)
L25	27	44.6096	128	30.9274	543	OBS (short-period)
L26	28	1.5142	128	40.2850	380	OBS (short-period)
L27	28	16.9294	128	52.2565	850	OBS (short-period)
L28	28	33.0433	129	2.8738	960	OBS (short-period)
L29	28	44.7226	129	21.1185	797	OBS (short-period)
L30	29	0.4083	129	32.7310	853	OBS (short-period)
C01	30	16.6100	131	38.3661	2717	BBOBS
C02	30	4.7624	131	49.0562	3148	LTOBS
C04	30	1.1357	131	27.5811	2525	BBOBS
C05	29	52.2208	131	36.7286	3442	BBOBS
C06	29	36.2933	131	57.6547	5168	BBOBS
C07	29	53.2480	131	15.4841	3001	LTOBS
C08	29	42.2671	131	30.2659	3349	LTOBS
C09	29	31.9279	131	21.8898	3835	LTOBS
C10	29	21.0387	131	36.8331	4759	BBOBS

Table 1. List of calibrated positions of OBS, BBOBS, and LTOBS.

3.3 Bathymetry, magnetic, and gravity observations

Bathymetry, magnetic, and gravity data were recorded continuously during the survey by using a multi-narrow beam echo sounder (SeaBeam3012, Wärtsilä ELAC Nautik), a three-component magnetometer (SFG-1214, Tiera Technica Ltd.), and a shipboard gravimeter (Marine Gravity Meter MGS-6, Micro-g LaCoste), respectively.

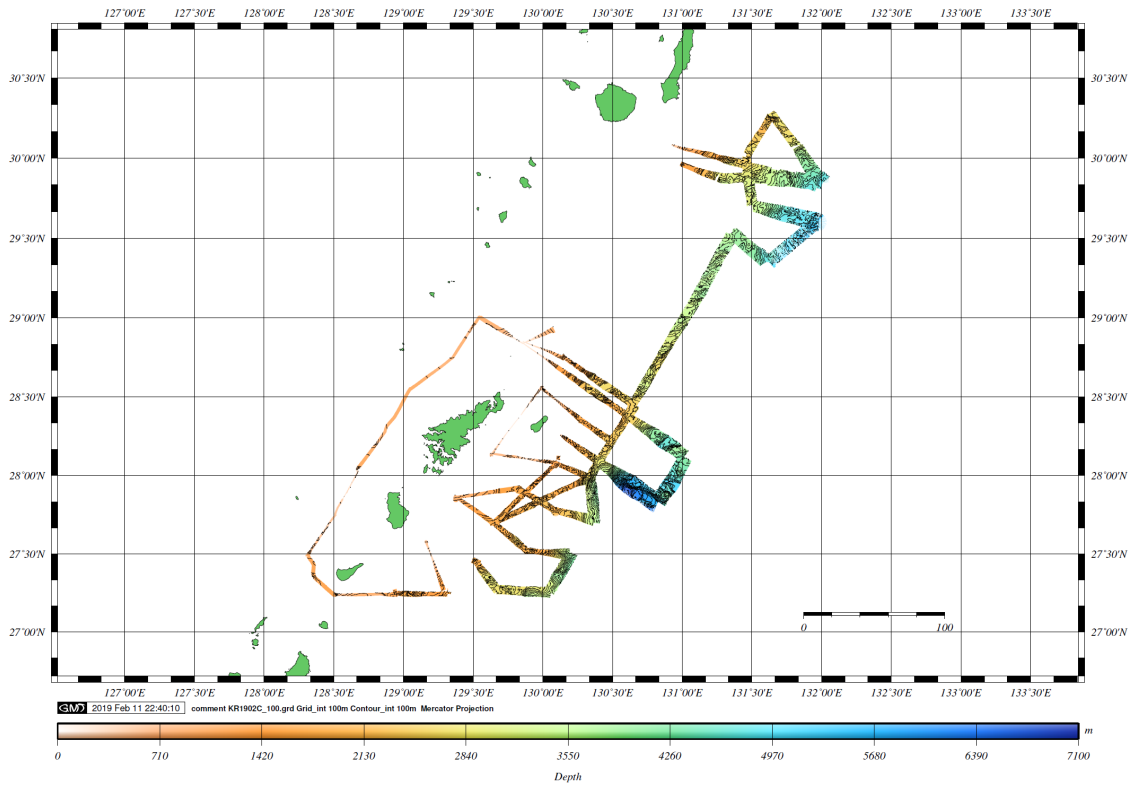

Fig. 3. Bathymetry data acquired during KR19-02C cruise

● 4. Cruise Log

2019/2/1 (Fri)	Departure from Kochi Port Transit to the survey area
2019/2/2 (Sat)	Transit to the survey area OBS deployment (L23, L27, L28, L29, L30)
2019/2/3 (Sun)	OBS deployment (L01, L04, L10, L11, L17, L18, L24, L25, L26)
2019/2/4 (Mon)	OBS deployment (L02, L03, L05, L06, L07, L12, L13, L14, L19)
2019/2/5 (Tue)	OBS deployment (L08, L09, L15, L16, L20, L21, L22) Bathymetry survey off east of Amami archipelago
2019/2/6 (Wed)	Bathymetry survey off east of Amami archipelago
2019/2/7 (Thu)	Calibration of BBOBS and LTOBS positions
2019/2/8 (Fri)	Stand by off south of Yaku-shima due to a bad oceanic condition
2019/2/9 (Sat)	Calibration of BBOBS and LTOBS positions Transit to Yokosuka
2019/2/10 (Sun)	Transit to Yokosuka
2019/2/11 (Mon)	Transit to Yokosuka
2019/2/12 (Tue)	Arrival at Yokosuka Port

Table 2. Cruise log of KR19-02C

● 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
E-mail: submit-rv-cruise@jamstec.go.jp

Acknowledgement

We thank the captain, Mr. Yoshiyuki Nakamura, and the crew of the R/V KAIREI for their efforts in OBS deployment, and other geophysical data observation. We are grateful to participants of the Research and Development center for Earthquake and Tsunami, Department of Deep Earth Structure and Dynamics Research, and Marine Technology Center in JAMSTEC for their great support in this cruise. This cruise is funded by a program “Research project for compound disaster mitigation on the great earthquakes and tsunamis around the Nankai trough region” which is part of the Special Coordination Funds for Promoting Science and Technology of the Ministry of Education, Culture, Sports, Science, and Technology. We used “The Generic Mapping Tools” by Wessel and Smith (1998) to construct the figures.