



YOKOSUKA Cruise Report
YK18-13C

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

Ryukyu Arc

Sep. 29, 2018 - Oct.11,2018

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

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1. Cruise Information

- Cruise ID
YK18-13C
- Name of vessel
R/V YOKOSUKA
- 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
Sep. 29, 2018 – Oct. 11, 2018
- Ports of departure / call / arrival
Departure: Yokosuka port / Arrival: Oita port
- Research area
Ryukyu arc
- Research map

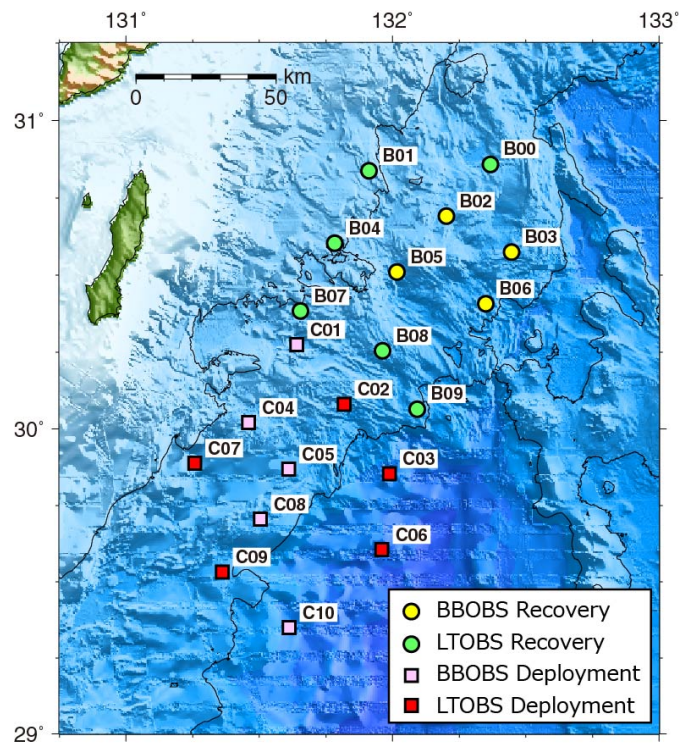


Fig. 1. Research Area. Circles mean positions of retrieved ocean bottom seismographs (OBSs), and squares represent deployed positions of OBSs. BBOBS and LTOBS respectively mean broadband OBSs (JAMSTEC) and long-term OBSs (The University of Tokyo).

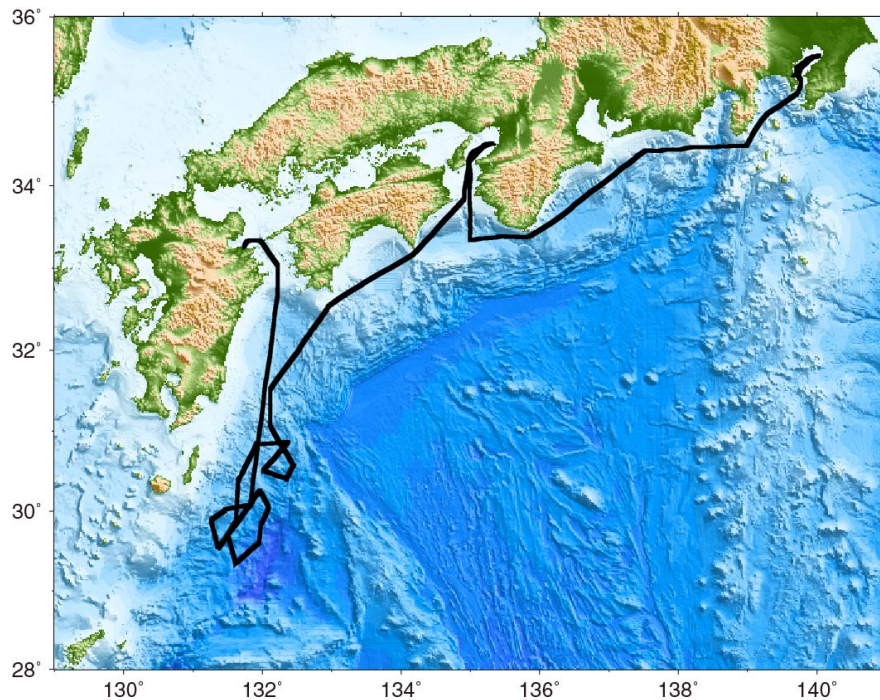


Fig.2. Ship track during YK18-13C cruise

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]
Yoshiyuki Kaneda [Kagawa Univ./JAMSTEC]
Daisuke Suetsugu [JAMSTEC]
Masanao Shinohara [The University of Tokyo]
Seiichi Miura [JAMSTEC]
Yasushi Ishihara [JAMSTEC]
Tsutomu Takahashi [JAMSTEC]
Aki Ito [JAMSTEC]
Tomoya Nakajima [JAMSTEC]
Hideji Abe [The University of Tokyo]
Yusuke Yamashita [Kyoto University]
Hiroko Sugioka [Kobe University]
Koichiro Obana [JAMSTEC]
Yojiro Yamamoto [JAMSTEC]
Takashi Tonegawa [JAMSTEC]
Yasuyuki Nakamura [JAMSTEC]
Gou Fujie [JAMSTEC]
Ayako Nakanashi [JAMSTEC]
Ryuta Arai [JAMSTEC]
Yuka Kaiho [JAMSTEC]

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 islands. 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 4 broadband OBSs (BBOBSs) and 6 long-term OBSs (LTOBSs) during YK17-16C cruise in 2017FY for a near-field observation of slow earthquakes. In this YK18-13C cruise, we recovered these OBSs, and deployed 10 OBSs off the southeast coast of Tanega-shima, Japan.

3.2 OBS recovery and deployment

We recovered 4 BBOBSs and 6 LTOBSs (B00 ~ B09) off east coast of Tanega-shima. Each recovered LTOBS is equipped with a three component 1Hz seismometer (LE3D/lite, Lennartz electronic). A BBOBS system is composed of a three-component broadband seismometer (CMG-3T, Guralp Systems) and a differential pressure gauge. A pressure-temperature logger (RBR TD 10000, RBR Ltd.) was fixed on the rim of each BBOBS.

We deployed 5 BBOBSs and 5 LTOBSs off southeast coast of Tanega-shima. Deployed LTOBS is equipped with the 1Hz seismometer or a 120s seismometer (Trillium Compact 120, Nanometrics). At 5 sites (C01, C02, C05, C06, and C10), the pressure-temperature logger was fixed on the rim of the BBOBS or LTOBS. Settled positions of OBSs at C02 and C08 were measured by slant ranges at three different positions.

We have planned to deploy 36 short-period OBSs around Amami islands, but could not carry out this deployment due to two typhoons.

OBS	North Latitude		East Longitude		Depth (m)	Remarks
	deg	min	deg	min		
B00	30	51.516	132	22.025	2844	LTOBS recovery
B01	30	50.233	131	54.743	1730	LTOBS recovery
B02	30	41.461	132	12.100	2592	BBOBS recovery
B03	30	34.463	132	26.805	3227	BBOBS recovery
B04	30	36.190	131	47.039	1930	LTOBS recovery
B05	30	30.585	132	1.038	2837	BBOBS recovery
B06	30	24.371	132	20.975	3951	BBOBS recovery
B07	30	22.959	131	39.271	2277	LTOBS recovery
B08	30	15.221	131	57.777	2825	LTOBS recovery
B09	30	3.832	132	5.556	3677	LTOBS recovery
C01	30	16.401	131	38.396	2695	BBOBS deployment
C02	30	4.762	131	49.056	3148	LTOBS deployment
C03	29	51.111	131	59.329	4876	LTOBS deployment
C04	30	1.093	131	27.614	2502	BBOBS deployment

C05	29	52.038	131	36.612	3416	BBOBS deployment
C06	29	36.204	131	57.654	5117	LTOBS deployment
C07	29	53.209	131	15.397	2974	LTOBS deployment
C08	29	42.267	131	30.266	3349	BBOBS deployment
C09	29	31.784	131	21.633	3820	LTOBS deployment
C10	29	20.898	131	36.683	4765	BBOBS deployment

Table 1. List of OBS positions.

3.3 Pressure and temperature observations

Pressure and temperature variations at seafloor were measured by the pressure-temperature logger at four sites (B02, B03, B05 and B06) off east coast of Tanega-shima. An example of raw data is shown in Figure 3. We deployed the same logger at five sites (C01, C02, C05, C06 and C10).

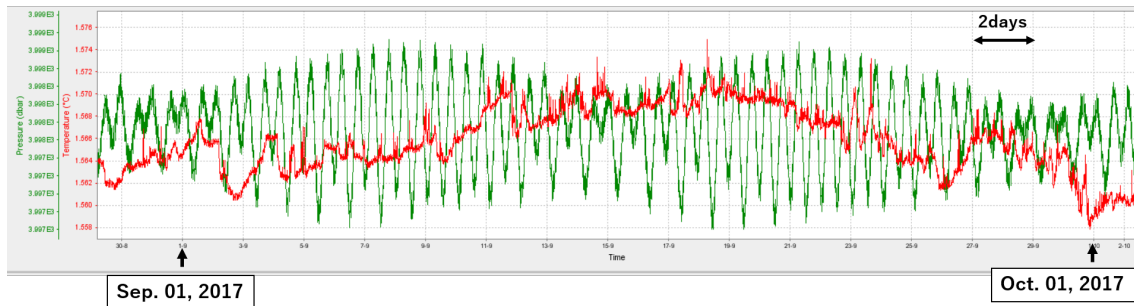


Fig. 3. Raw-data example of pressure (green) and temperature (red) at B06.

3.4 Bathymetry, magnetic, and gravity observations

Bathymetry, magnetic, and gravity data were recorded continuously during the survey by using a multi-narrow beam echo sounder (EM122, Kongsberg), a three-component magnetometer (SFG-1212, Tiera Technica Ltd.), and a shipboard gravimeter (G-MODEL S-63, LaCoste & Romberg LLC), respectively.

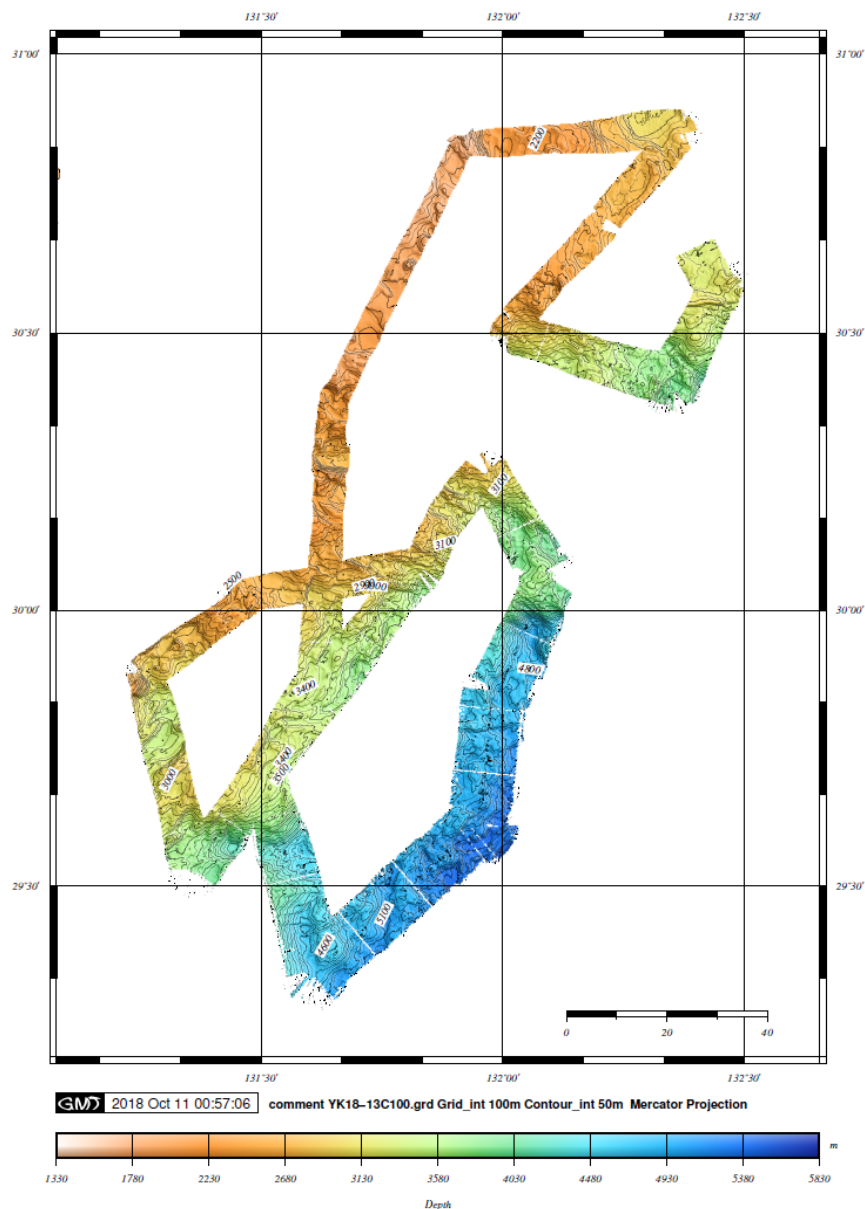


Fig. 4. Bathymetry data acquired during YK18-13C cruise

• 4. Cruise Log

2018/9/29 (Sat)	Departure from JAMSTEC Stand by at Tokyo bay due to a typhoon
2018/9/30 (Sun)	Stand by at Tokyo bay due to a typhoon
2018/10/1 (Mon)	Stand by at Tokyo bay due to a typhoon
2018/10/2 (Tue)	Stand by at Tokyo bay due to a typhoon Transit to the survey area
2018/10/3 (Wed)	Transit to the survey area Stand by at Osaka bay due to a typhoon
2018/10/4 (Thu)	Stand by at Osaka bay due to a typhoon
2018/10/5 (Fri)	Stand by at Osaka bay due to a typhoon
2018/10/6 (Sat)	Stand by at Osaka bay due to a typhoon

2018/10/7 (Sun)	Stand by at Osaka bay due to a typhoon Transit to the survey area
2018/10/8 (Mon)	Transit to the survey area OBS recovery (B00, B01, B02, B03, B05, B06)
2018/10/9 (Tue)	OBS recovery (B04, B07, B09) OBS deployment (C01, C03, C05, C06, C08, C10)
2018/10/10 (Wed)	OBS recovery (B08) OBS deployment (C02, C04, C07, C09) Calibration of OBS positions (C02, C08) Transit to Oita port
2018/10/11 (Thu)	Arrival at Oita Port

Table 2. Cruise log of YK18-13C

● 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.
Users of information on this report are requested to submit Publication Report to JAMSTEC.

<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. Takafumi Aoki, and the crew of the R/V YOKOSUKA for their efforts in OBS deployment, OBS recovery, 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.