



S/V Yokosuka Cruise Report YK21-14

High-resolution research of marine seismogenic faults in
wide area: Seismic survey and earthquake observation



Hyuga-nada, Nankai Trough

Aug. 7, 2021- Aug. 17 2021

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

Contents:

1. Cruise Information :
2. Research Proposal and Scientific Party
3. Research/Development Activities
4. Cruise Log
5. Notice on using:

1. Cruise Information

- Cruise ID: YK21-14
- Name of vessel: S/V Yokosuka
- Title of cruise: High-resolution research of marine seismogenic faults in wide area: Seismic survey and earthquake observation
- Chief Scientist [Affiliation]: Ryuta Arai [JAMSTEC]
- Cruise period: Aug. 7, 2021-Aug. 17, 2021
- Ports of departure / call / arrival: Yokosuka (JAMSTEC HQ) -Yokosuka (JAMSTEC HQ)
- Research area: Hyuga-nada, Nankai Trough
- Research map

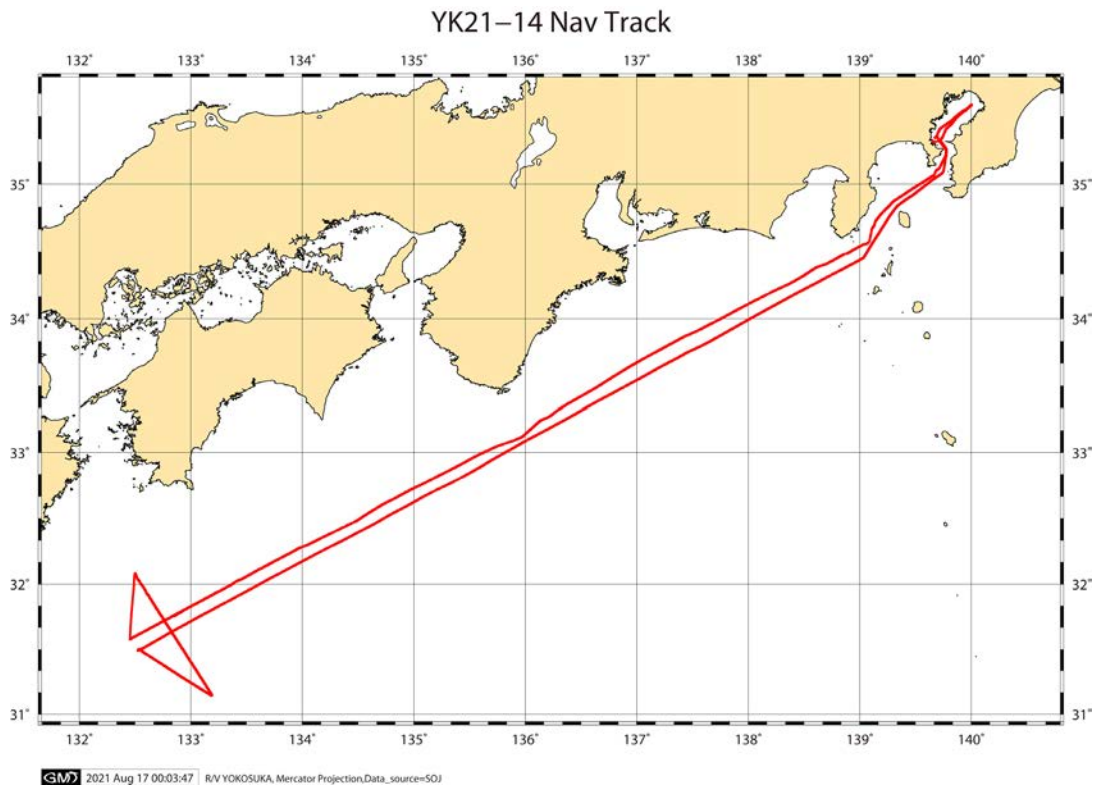


Figure 1. Ship track of the YK21-14 cruise.

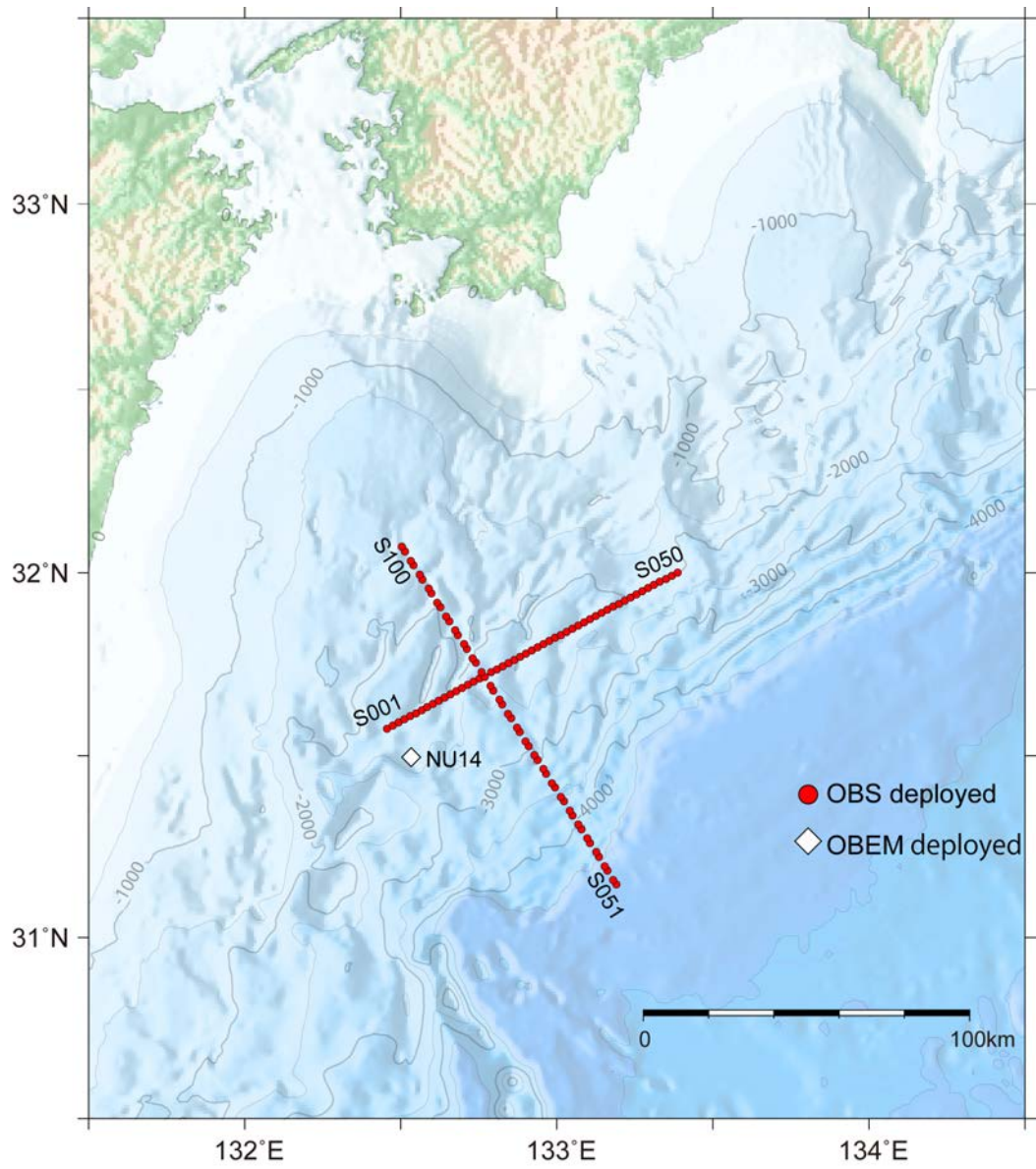


Figure 2. OBS/OBEM locations deployed during the YK21-14 cruise.

2. Research Proposal and Science Party

- Title of proposal:

Proposal 1: High-resolution research of marine seismogenic faults in wide area:
Seismic survey and earthquake observation

Proposal2: Electro-magnetic observation in the Hyuga-nada

- Representative of Science Party [Affiliation]:

Proposal1: Seiichi Miura [JAMSTEC]

Proposal2: Hiroshi Ichihara [Nagoya University]

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

Proposal1:

Shuichi Kodaira	[JAMSTEC]
Yasushi Ishihara	[JAMSTEC]
Koichiro Obana	[JAMSTEC]
Seiichi Miura	[JAMSTEC]
Gou Fujie	[JAMSTEC]
Yasuyuki Nakamura	[JAMSTEC]
Ryuta Arai	[JAMSTEC]
Yuka Kaiho	[JAMSTEC]
Ayako Nakanishi	[JAMSTEC]
Tetsuo No	[JAMSTEC]
Kazuya Shiraishi	[JAMSTEC]
Ryo Miura	[JAMSTEC]
Toshinori Saijo	[JAMSTEC]
Yanfang Qin	[JAMSTEC]
Tsutomu Takahashi	[JAMSTEC]
Yojiro Yamamoto	[JAMSTEC]
Takashi Tonegawa	[JAMSTEC]
Eiichiro Araki	[JAMSTEC]
Takashi Yokobiki	[JAMSTEC]
Hiroyuki Matsumoto	[JAMSTEC]
Toshinori Kimura	[JAMSTEC]
Yanxue Ma	[ERI, University of Tokyo]

Proposal2:

Hiroshi Ichihara	[Nagoya University]
Noriko Tada	[JAMSTEC]
Hayato Nakamura	[Nagoya University]

Onboard Technician

Ikumasa Terada	[NME]
Takuya Maekawa	[NME]
Hidenori Shibata	[NME]
Taro Shirai	[NME]
Toshinori Saijo	[NME]

Kimiko Serizawa	[NME]
Yoshiki Horiuchi	[NME]
Haruki Doi	[NME]
Tatsuya Sugiyama	[NME]
Hiroyoshi Shimizu	[NME]

● Crew

Captain	Tatsuo Adachi	[NME]
Chief Officer	Tetsuo Shirayama	[NME]
2nd Officer	Tomonari Kajisa	[NME]
3rd Officer	Keita Ushimaru	[NME]
Jr.3rd Officer	Yuto Obata	[NME]
Chief Engineer	Minoru Tsukada	[NME]
1st Engineer	Kenichi Shirakata	[NME]
2nd Engineer	Kota Fujii	[NME]
3rd Engineer	Kohshun Ikezaki	[NME]
Chief Electronics Operator	Shunsuke Fukagawa	[NME]
2nd Electronics Operator	Takayuki Mabara	[NME]
3rd Electronics Operator	Keisuke Oi	[NME]
Boat Swain	Yosuke Kuwahara	[NME]
Quarter Master	Tsuyoshi Chimoto	[NME]
Quarter Master	Nao Ishizuka	[NME]
Quarter Master	Shinya Ueno	[NME]
Sailor	Takuma Tokunaga	[NME]
Sailor	Eishin Sato	[NME]
No.1 Oiler	Katsuyuki Yoshida	[NME]
Oiler	Seiya Watanabe	[NME]
Oiler	Motohiro Kawano	[NME]
Assistant Oiler	Reo Shinzato	[NME]
Assistant Oiler	Kazuyuki Fukuda	[NME]
Chief Steward	Kazuhiro Hirayama	[NME]
Steward	Yoshio Okada	[NME]
Steward	Mizuki Nakano	[NME]
Steward	Yuki Shirasaki	[NME]
Steward	Yuta Hangai	[NME]

3. Research/Development Activities

- Purpose and background:

The cruise YK21-14 aims at revealing three-dimensional geometry and physical properties of faults in the Nankai Trough region as described in the mid-term to long-term research plan of JAMSTEC. In the survey area ranging from the westernmost part of the Nankai Trough to the Hyuga-nada area, the plate coupling condition changes rapidly in the along-trough direction, and slow earthquakes including slow slip events and very low frequency earthquakes occur at the shallow and deep parts of the subduction zones. To reveal structural controls on the variety of slip behaviors, we carry out a seismic refraction survey. For this survey, we deployed one hundred short-period ocean bottom seismographs (OBS) on the along-trough and across-trough profiles during this cruise.

In addition, we deployed one ocean bottom electromagnetometer (OBEM). This operation was proposed by Nagoya University at the second symposium for science cruises of Research Institute for Marine Geodynamics. The OBEM deployment was also a part of the collaborative research between JAMSTEC and Nagoya University entitled "Science of Hyuga-nada seismogenic zone".

- List of observations

- (1) OBS deployment

We deployed a total of 100 OBSs on two seismic lines (50 on each line). Due to the ship time significantly reduced by continuous bad weather conditions, we traced the location of OBSs by acoustic communication only down to 500 m depth during the OBS falling in the seawater and skipped determining the seafloor position except for 6 OBSs (S21-25 and S77).

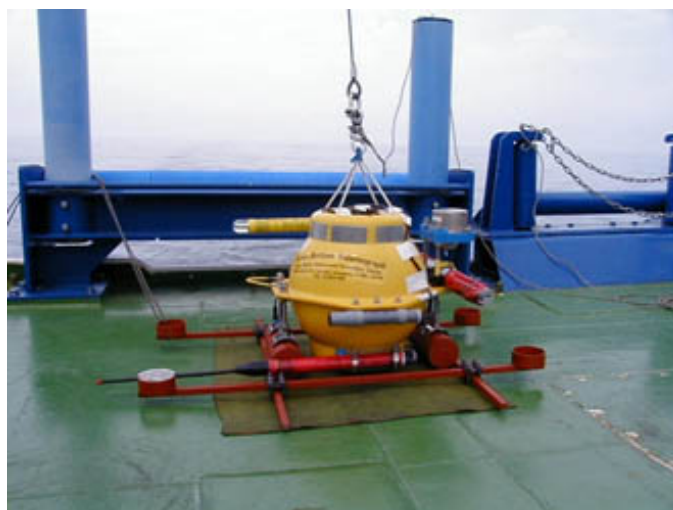


Figure 3. Ocean Bottom Seismograph (OBS) deployed during the cruise.

(2) OBEM deployment

We deployed one OBEM at NU14 out of three planned locations. After releasing, we traced and determined its seafloor location using the acoustic communication.

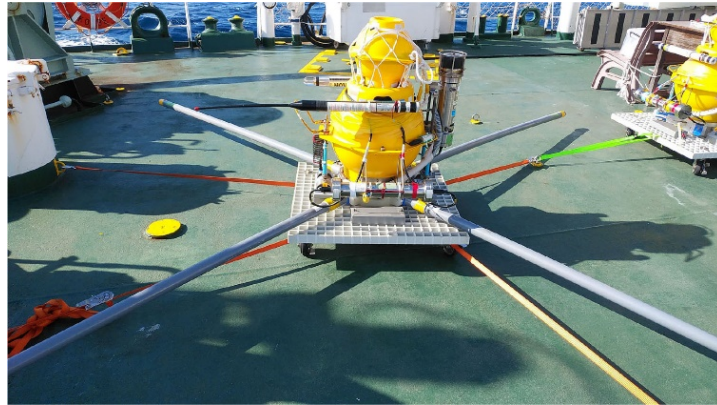


Figure 4. Ocean Bottom Electromagnetometer (OBEM) deployed during the cruise.

(3) XBT (eXpendable-Bathy Thermograph)

One XBT cast was conducted during the cruise to obtain seawater temperature.

(4) Bathymetry and magnetic data

Bathymetry and magnetic data were acquired during the cruise. Bathymetry data was recorded by EM122 Multibeam Echosounder of Kongsberg. Magnetic data was acquired by SFG-1212 three component magnetometer of TERATECHNICA Inc.

● 4. Cruise Log

Date		Remarks
2021/8/7	Sat	4 Scientists and 1 OBS technician onboard, Departure from JAMSTEC Yokosuka HQ, Standby in Tokyo Bay (due to bad weather)
2021/8/8	Sun	Standby in Tokyo Bay (due to bad weather)
2021/8/9	Mon	Standby in Tokyo Bay (due to bad weather)
2021/8/10	Tue	Standby in Tokyo Bay (due to bad weather)
2021/8/11	Wed	9 OBS technicians onboard, Transit to survey area
2021/8/12	Thu	Transit to survey area, XBT measurement, OBS deployment (S50-S44)
2021/8/13	Fri	OBS deployment (S43-S21), OBS location determination (S25-S21), Standby (due to bad weather), OBS deployment (S20-S01)
2021/8/14	Sat	OBS deployment (S100-S77), Standby (due to bad weather)
2021/8/15	Sun	Standby (due to bad weather) OBS deployment (S76-S51), OBEM deployment (NU14)
2021/8/16	Mon	Transit to Yokosuka
2021/8/17	Tue	Arrive at JAMSTEC Yokosuka

●OBS deployment time

Aug 12	(JST)	Aug 13	(JST)	Aug 14	(JST)	Aug 15	(JST)
S50	15:39:50	S34	0:28:22	S100	0:30:57	S76	9:51:29
S49	16:12:43	S33	0:59:11	S99	0:58:45	S75	10:07:19
S48	16:44:30	S32	1:30:18	S98	1:33:45	S74	10:34:05
S47	17:14:10	S31	1:58:20	S97	1:51:46	S73	10:52:23
S46	17:46:34	S30	2:28:47	S96	2:23:16	S72	11:14:27
S45	18:17:33	S29	3:09:04	S95	2:49:01	S71	11:31:28
S44	18:48:15	S28	3:42:28	S94	3:17:22	S70	11:54:55
S43	19:18:28	S27	4:16:07	S93	3:44:41	S69	12:11:21
S42	19:53:30	S26	4:49:58	S92	4:14:05	S68	12:32:45
S41	20:25:21	S25	5:25:14	S91	4:36:03	S67	12:50:24
S40	20:57:55	S24	6:01:03	S90	5:08:13	S66	13:10:34
S39	21:31:20	S23	6:41:04	S89	5:35:14	S65	13:27:28
S38	22:07:41	S22	7:23:15	S88	6:01:45	S64	13:51:22
S37	22:43:22	S21	8:10:41	S87	6:19:39	S63	14:07:33
S36	23:17:22	S20	14:08:40	S86	6:45:01	S62	14:29:36
S35	23:52:24	S19	14:39:22	S85	7:02:58	S61	14:45:13
		S18	15:09:37	S84	7:31:18	S60	15:06:56
		S17	15:46:11	S83	7:50:13	S59	15:22:40
		S16	16:12:37	S82	8:12:44	S58	15:44:54
		S15	16:37:11	S81	8:32:15	S57	16:01:34
		S14	17:00:11	S80	8:56:44	S56	16:24:53
		S13	17:25:22	S79	9:14:26	S55	16:41:42
		S12	17:44:59	S78	9:35:44	S54	17:06:49
		S11	18:10:54	S77	9:54:14	S53	17:22:58
		S10	18:31:54			S52	17:44:19
		S09	18:52:47			S51	18:00:36
		S08	19:13:13				
		S07	19:34:26				
		S06	19:56:09				
		S05	20:16:14				
		S04	20:37:57				
		S03	20:59:04				
		S02	21:22:06				
		S01	21:45:33				

●OBEM deployment time

Aug 15	(JST)
NU14	21:32:41 (release), 22:28:30 (on seafloor))

● 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

Acknowledgements

We thank the captain, Mr. Tatsuo Adachi, the crew members of the S/V Yokosuka and OBS technicians for their efforts in OBS/OBEM deployment work. Without their dedicated work during the cruise, the OBS operation could never have been successful. We are also grateful to members of IMG (Research Institute for Marine Geodynamics) and MarE3 (Institute for Marine-Earth Exploration and Engineering) of JAMSTEC for their great support on this cruise.