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R/V Kairei Cruise Report

KR19-07

Seismic survey and observations in Kuril Trench region

Seismic survey in Kuril Trench

Aug 26, 2019 - Sep 15, 2019

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

●**Contents**

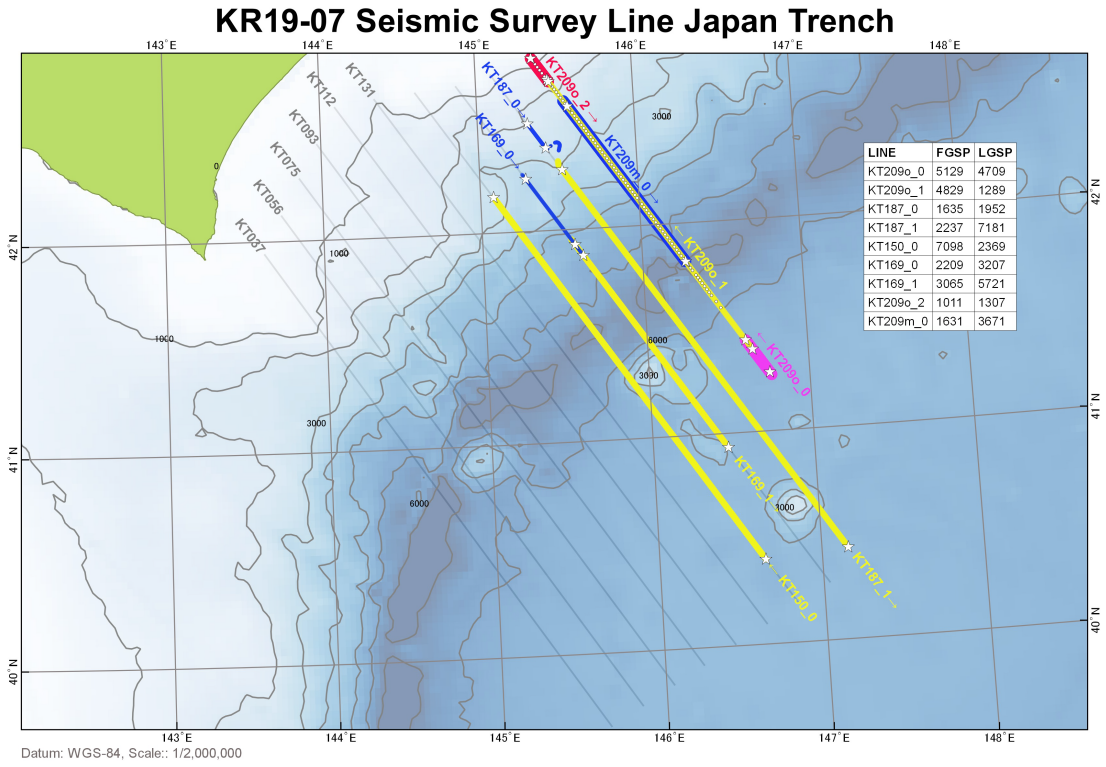
1. Cruise Information

- Cruise ID: KR19-07
- Name of vessel: R/V Kairei
- Title of the cruise: Seismic survey in Kuril Trench
- Title of proposal:

  Marine Geological and Geophysical surveys to investigate the nature of subduction zone mega earthquakes and tsunamis
- Cruise period:

  Aug 26, 2019 – Sep 15, 2019
- Ports of departure / call / arrival:

  Hachinohe – Yokosuka (JAMSTEC)
- Research area: Kuril Trench
- Research Map



2. Researchers

● Chief scientist [Affiliation]:

Gou Fujie [JAMSTEC]

● Representative of the science party: Shuichi Kodaira [JAMSTEC]

● Science party:

Shuichi Kodaira [JAMSTEC]
Seiichi Miura [JAMSTEC]
Yasuyuki Nakamura [JAMSTEC]
Gou Fujie [JAMSTEC]
Yuka Kaiho [JAMSTEC]
Tetsuo No [JAMSTEC]
Mikiya Yamashita [JAMSTEC]
Taro Shirai [JAMSTEC]
Ryuta Arai [JAMSTEC]
Ayako Nakanishi [JAMSTEC]
Koichiro Obana [JAMSTEC]
Tsutomu Takahashi [JAMSTEC]
Yojiro Yamamoto [JAMSTEC]
Hajime Shiobara [ERI, University of Tokyo]
Tomoaki Yamada [ERI, University of Tokyo]
Takehi Isse [ERI, University of Tokyo]
Masanao Shinohara [ERI, University of Tokyo]
Yasushi Ishihara [JAMSTEC]
Takashi Tonegawa [JAMSTEC]
Ryota Hino [Tohoku Univ.]
Ryosuke Azuma [Tohoku Univ.]

3. Observation

(1) Objectives:

Megathrust earthquakes have repeatedly occurred along the Kuril Trench subduction zone off Hokkaido. After the occurrence of the megathrust earthquakes in the plate subduction zone, large outer rise earthquakes, which can cause devastating tsunami, are expected to occur in the oceanward of the Kuril Trench. To evaluate the hazard of these megathrust earthquakes and outer rise earthquakes, we conducted controlled-source seismic survey in the trench-outer rise region of the Japan Trench as described below.

(2) List of observations:

1) Deployment of ocean bottom seismometers (OBSs)

We deployed OBSs at 81 sites along the line KT209;

Table 1: OBS positions along KT209 (After position fixed using airgun shot data)

Site	Longitude(E)	Latitude(N)	Depth(m)
s01	42.8003267	145.3710117	765.8
s02	42.7847417	145.3848483	989.9
s03	42.7699550	145.3980833	1288.5
s04	42.7551783	145.4135850	1454.2
s05	42.7408733	145.4270650	1589.3
s06	42.7239250	145.4428783	1714.9
s07	42.7076017	145.4573567	1814.7
s08	42.6912183	145.4725183	1892.8
s09	42.6749067	145.4878067	1991.4
s10	42.6623133	145.5010267	2042.3
s11	42.6490500	145.5139367	2056.8
s12	42.6347583	145.5248000	2073.2
s13	42.6224800	145.5384850	2105.0
s14	42.6076817	145.5502667	2106.1
s15	42.5916567	145.5673267	2181.0
s16	42.5770067	145.5792583	2337.3
s17	42.5598583	145.5938633	2480.8
s18	42.5502500	145.6061600	2538.3
s19	42.5357733	145.6200517	2594.2
s20	42.5176250	145.6342583	2684.0
s21	42.5030200	145.6475950	2733.0
s22	42.4872817	145.6615683	2840.9
s23	42.4732183	145.6752183	2898.6
s24	42.4583450	145.6895583	2932.8
s25	42.4430867	145.7018583	2949.6

s26	42.4281300	145.7163133	3068.1
s27	42.4125517	145.7296850	3145.6
s28	42.3998300	145.7439633	3184.7
s29	42.3835883	145.7568700	3229.3
s30	42.3690350	145.7700700	3307.7
s31	42.3541400	145.7854450	3496.0
s32	42.3409150	145.7971917	3340.6
s33	42.3262733	145.8107200	3366.0
s34	42.3093600	145.8242917	3322.7
s35	42.2951700	145.8389917	3509.8
s36	42.2790867	145.8501950	3649.3
s37	42.2645983	145.8659400	3831.0
s38	42.2498283	145.8799767	3913.1
s39	42.2350583	145.8942967	3842.3
s40	42.2197167	145.9066117	4074.3
s41	42.2048917	145.9207467	4234.6
s42	42.1895067	145.9332400	4461.1
s43	42.1757000	145.9479700	4396.9
s44	42.1606467	145.9617633	4706.6
s45	42.1447400	145.9755583	4898.2
s46	42.1313567	145.9850317	5168.3
s47	42.1167150	146.0007283	5230.2
s48	42.1009533	146.0155983	5297.5
s49	42.0866750	146.0285967	5381.3
s50	42.0695233	146.0425017	5380.2
s51	42.0552017	146.0560500	5342.3
s52	42.0403100	146.0707867	5364.6
s53	42.0253150	146.0837517	5683.3
s54	42.0108767	146.0979400	5682.4
s55	41.9951150	146.1128367	5802.3
s56	41.9816450	146.1222317	5959.0
s57	41.9667500	146.1364617	5841.6

s58	41.9503550	146.1513617	5860.0
s59	41.9358283	146.1638200	5968.5
s60	41.9207967	146.1777383	6139.9
s61	41.9060617	146.1915750	6261.9
s62	41.8893367	146.2034817	6507.7
s63	41.8759717	146.2178150	6706.4
s64	41.8609767	146.2310217	6688.7
s65	41.8454683	146.2433467	6729.9
s66	41.8313300	146.2575117	6922.5
s67	41.8158583	146.2724500	7209.6
s68	41.8017400	146.2863033	7245.0
s69	41.7885967	146.2994167	7179.2
s70	41.7743933	146.3096367	7005.3
s71	41.7488683	146.3268400	6923.3
s72	41.7402800	146.3404400	6906.2
s73	41.7274717	146.3546767	6835.2
s74	41.7136450	146.3698317	6730.3
s75	41.6976667	146.3844100	6563.8
s76	41.6838867	146.3967517	6556.1
s77	41.6673183	146.4118433	6009.6
s78	41.6504450	146.4212967	5828.0
s79	41.6376967	146.4367450	6235.6
s80	41.6229633	146.4499283	5971.1
s81	41.5903967	146.4754967	5904.6

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2) Wide-angle seismic reflection and refraction survey

For OBS, we shot the tuned airgun array of R/V Kairei along the line KT209 at a spacing of 200 meter. During the airgun shooting, we towed a hydrophone streamer cable to collect the multi-channel seismic reflection data as well.

3) Multi-channel seismic reflection survey

We shot the tuned airgun array of R/V Kairei at a spacing of 50 meter along 4 survey lines with towing a long hydrophone streamer cable to collect multi-channel seismic reflection data. The length of the streamer cable was dependent on the survey line (see Table 2 and Table 3).

Table 2. Controlled-source seismic survey lines (start and end points).

Line	Vessel position	
	Longitude	Latitude
KT150	40.396531'N	146.653050'E
	42.166803'N	145.082742'E
KT169	42.271103'N	145.266556'E
	40.935369'N	146.463847'E
KT187	42.509656'N	145.317464'E
	40.430922'N	147.162642'E
KT209m	42.606733'N	145.551272'E
	41.820344'N	146.267894'E
KT209o	41.262131'N	146.762956'E
	42.814181'N	145.359158'E

Table 3: Streamer length and number of hydrophone channels

Lines	Streamer length	Number of channels
KT150, KT169, KT187, KT209m, KT209o	5700	444

4) Recovery of OBSs

We recovered one OBS at site 79. The rest of 80 OBSs were recovered by another vessel (S/V Yokosuka) during this cruise.

5) Bathymetry, magnetics and gravity observation

During the cruise, bathymetry, magnetics and gravity data have been recorded continuously by multi-beam echo sounder (MBES), three-component magnetometer and gravity meter, respectively.

(3) Cruise Log

Date	Remarks
2019/8/26	Departure from Hachinohe. Transit to survey area
2019/8/27	OBS deployment (from west to east)
2019/8/28	OBS deployment
2019/8/29	OBS deployment
2019/8/30	OBS deployment
2019/8/31	Deployment of MCS system.
2019/9/1	Airgun shooting along KT209 (from east to west), 200m shot spacing Recovery of MCS system OBS site79 recovered. Site81 deployment
2019/9/2	Deployment of MCS system
2019/9/3	Airgun shooting along KT209 (from east to west), 200m shot spacing Airgun shooting along KT187 (from west to east),50m shot spacing
2019/9/4	Airgun shooting along KT187 (from west to east),50m shot spacing
2019/9/5	Airgun shooting along KT187 (from west to east),50m shot spacing Airgun shooting along KT150 (from east to west),50m shot spacing
2019/9/6	Airgun shooting along KT150 (from east to west),50m shot spacing
2019/9/7	Arigun shooting along KT169 (from west to east), 50m shot spacing
2019/9/8	Arigun shooting along KT169 (from west to east), 50m shot spacing Recovery of MCS system
2019/9/9	Wait on weather off Tomakomai
2019/9/10	Deployment of MCS system Airgun shooting along KT209 (from west to east), 200m shot spacing
2019/9/11	Airgun shooting along KT209 (from west to east), 50m shot spacing Recovery of MCS system
2019/9/12	Servey of sea floor (MBES)
2019/9/13	Transit to Yokosuka
2019/9/14	Transit to Yokosuka
2019/9/15	Arrival at Yokosuka (JAMSTEC)

● 4. Notice on Using

Notice on using: Insert the following notice to users regarding the data and samples obtained.

This cruise report is a preliminary documentation as of the end of the cruise.
This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.
Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.