

SJADES 2018 biodiversity research cruise: Methodology and station data

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Abstract. The South Java Deep-Sea (SJADES) Biodiversity Expedition 2018 was a joint expedition organised by the Indonesian Institute of Sciences (LIPI) and the National University of Singapore (NUS). Benthic samples were collected in the deeper waters of Sunda Strait as well as off the southwest coast of Java from Pulau Panaitan to Cilacap along the northern slopes of the Sunda Trough over two weeks in March and April 2018. Details pertaining to the vessel, cruise participants, collecting equipment used onboard, and localities where biological material were collected are provided.

Key words. Java, Sunda Strait, Sunda Trough, *Baruna Jaya VIII*, beam trawl, Warèn dredge, box corer, multi-corer

INTRODUCTION

The South Java Deep-Sea (SJADES) Biodiversity Expedition was jointly organised by the Indonesian Institute of Sciences (LIPI) and the National University of Singapore (NUS). The areas of interest were the deep waters of the Sunda Strait and the northern slope of the Sunda Trough off the western coastline of southern Java, Indonesia. The 14-day cruise was conducted on board the LIPI research vessel *Baruna Jaya VIII*, which started its journey from Muara Baru, Jakarta, Indonesia on 23rd March 2018 and returned to the same port of call on 5th April 2018. A total of 30 scientists from Indonesia, Singapore, Taiwan, and France took part in the cruise (Table 1; see also Ng & Rahayu, 2021, in this volume).

Ng & Rahayu (2021, in this volume) provide a detailed overview of the research cruise, including the background and how the areas were selected. They also summarise the major research outcomes and outputs of the cruise.

SPECIMEN COLLECTION EQUIPMENT AND METHODS

Sampling vessel. K.R. *Baruna Jaya VIII* is 53.2 m long and 12.5 m wide and has a cruise speed of 10 knots. It is equipped with five laboratories, a 5T SWL A-frame, single and multi-beam echosounders (only the single beam instrument was used), a box corer, and rooms that can accommodate 30 researchers or surveyors.

Beam trawl and Warèn dredge. The beam trawl (Fig. 1A) was composed of a 4 m long wooden beam which defined the width of the trawl. Each end of the beam was attached with a skid of 0.5 m height, and a tickler chain connected the pair of skids in front of the net (*chalut à perche*, or CP; for more details see Tsai et al., 2009; Chan et al., 2017). The length of the main net was 8.8 m and the mesh size was 13 mm. An additional secondary net with a smaller mesh (7 mm) was attached on the inside of the cod end of the main net. This instrument was trawled along the seafloor for about 25 minutes at 0.5–2 knots during each deployment. After recovery, the sediments were washed through sieves of 5-mm and 1-mm mesh sizes using seawater. Specimens retained on the sieves were immediately sorted to major taxa on the vessel deck and placed on trays with chilled seawater. Digital images of selected specimens were later obtained in a dedicated photography area. All specimens were fixed and preserved according to the requirements of the respective scientists. The Warèn dredge (Fig. 1B; Chan et al., 2017) has a 1.0 m × 0.3 m opening with a net length of 3 m and mesh size of 3 cm with an additional net with a smaller mesh (7 mm) attached on the inside of the cod end. Samples collected were treated in the same manner as those in the trawl.

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Table 1. SJADES participants, with their family names in bold. Affiliation: LKCNHM = Lee Kong Chian Natural History Museum; LIPI = Indonesian Institute of Sciences; MNHN = Muséum d'Histoire Naturelle, Paris; NDWU = National Dong Hwa University, Hualien, Taiwan; NTOU = National Taiwan Ocean University, Keelung, Taiwan; NUS = National University of Singapore; RCDS = Research Center for Deep Sea, Ambon; RCO = Research Centre for Oceanography, Jakarta; TMSI = Tropical Marine Science Institute, NUS; UI = University of Indonesia.

No.	Name	Affiliation	Designation	Research interest
1	Praditya Avianto	RCO-LIPI	Mapper	Geology
2	Eko Burhanuddin	UI	Biologist	Stomatopoda
3	Chan Tin-Yam	NTOU	Biologist	Caridea and Dendrobranchiata
4	Chim Chee Kong	TMSI, NUS	Biologist	Peracarida
5	Chuar Cheah Hoay	TMSI, NUS	Biologist	Annelida
6	Nurul Fitriya	RCO, LIPI	Biologist	Copepoda
7	Gan Bin Qi	TMSI, NUS	Biologist	Nematoda
8	Hadiyanto Hadiyanto	RCO, LIPI	Biologist	Annelida
9	Iffah binte Iesa	LKCNHM, NUS	Biologist	Cnidaria
10	Muhammad Masrur Islami	RCDS, LIPI	Biologist	Mollusca
11	Lim Swee Cheng	TMSI, NUS	Biologist	Porifera
12	Lin Chia-Wei	NDWU	Biologist	Galatheaidea
13	Jose Christopher Escaño Mendoza	LKCNHM, NUS	Biologist	Brachyura
14	Peter Ng Kee Lin	LKCNHM, NUS	Chief scientist	Brachyura
15	Dharma Arif Nugroho	RCDS, LIPI	Biologist	Brachyura
16	Selvia Oktaviyani	RCO, LIPI	Biologist	Pisces
17	Rene Ong Sheue Lin	LKCNHM, NUS	Photographer	Photographer
18	Teguh Peristiwady	RCDS, LIPI	Biologist	Pisces
19	Dwi Listyo Rahayu	RCO, LIPI	Chief scientist	Paguroidea
20	Bertrand Richer de Forges	MNHN	Biologist	Brachyura
21	Muhammad Dzaki bin Safaruan	LKCNHM, NUS	Technician	General
22	Riyana Subandi	RCO, LIPI	Technician	General
23	Tan Heok Hui	LKCNHM, NUS	Biologist	Pisces
24	Tan Koh Siang	TMSI, NUS	Biologist	Mollusca
25	Tan Siong Kiat	LKCNHM, NUS	Biologist	Mollusca
26	Samantha Tong Jia Wen	NUS (TMSI)	Biologist	Copepoda
27	Indra Bayu Vimono	RCO, LIPI	Biologist	Echinodermata
28	Ernawati Widyastuti	RCO, LIPI	Biologist	Brachyura
29	Ismiliana Wirawati	RCO, LIPI	Biologist	Echinodermata
30	Yang Chien-Hui	NTOU	Biologist	Scyllaridae

Box corer. Dimensions of the box corer (Fig. 1C) were 60 cm L × 50 cm W × 50 cm H. For each deployment, the stainless steel corer was lowered at about 1 m.s⁻¹ until it reached about 100 m above the seabed, after which the speed was lowered to 0.5 m.s⁻¹, while paying attention to the winch wire tensiometer. As an acoustic pinger was not available, the approximate height of the corer above the seabed was estimated by comparing the length of the winch wire that was paid out with the depth of the sea provided by the ship echosounder. When the wire tensiometer showed a loss in tension, indicating that the corer has touched the seabed, an interval of 3 seconds was allowed before the winch was stopped. A further 10 seconds was allowed to pass before the winch was reversed and the corer was raised at a rate of about 0.5 m.s⁻¹ for the first 100 m and then retrieved at 1 m.s⁻¹. Upon recovery of the corer, the top

water was siphoned into a bucket and kept aside. Samples from all stations, except CR09, were sectioned into 0–2 cm, 2–5 cm, and 5–10 cm depth layers. The top water was then combined with the 0–2 cm sediment. These fractions were passed through 300 µm followed by 250 µm mesh size sieves using chilled (4–10°C) filtered (to 40 µm) seawater. Sediment retained on the sieves from different depths were stored separately and fixed in 10% borax-buffered formalin. As the sample from CR09 contained only a small quantity of sediment due to unsuccessful deployment, the sediment was not differentiated according to depth and was treated in its entirety.

Multiple corer. The multiple corer used in this survey was an OSIL Mega Corer (Fig. 1D) with 12 perspex tube cores each of length 70 cm with a diameter of 60 mm. This corer

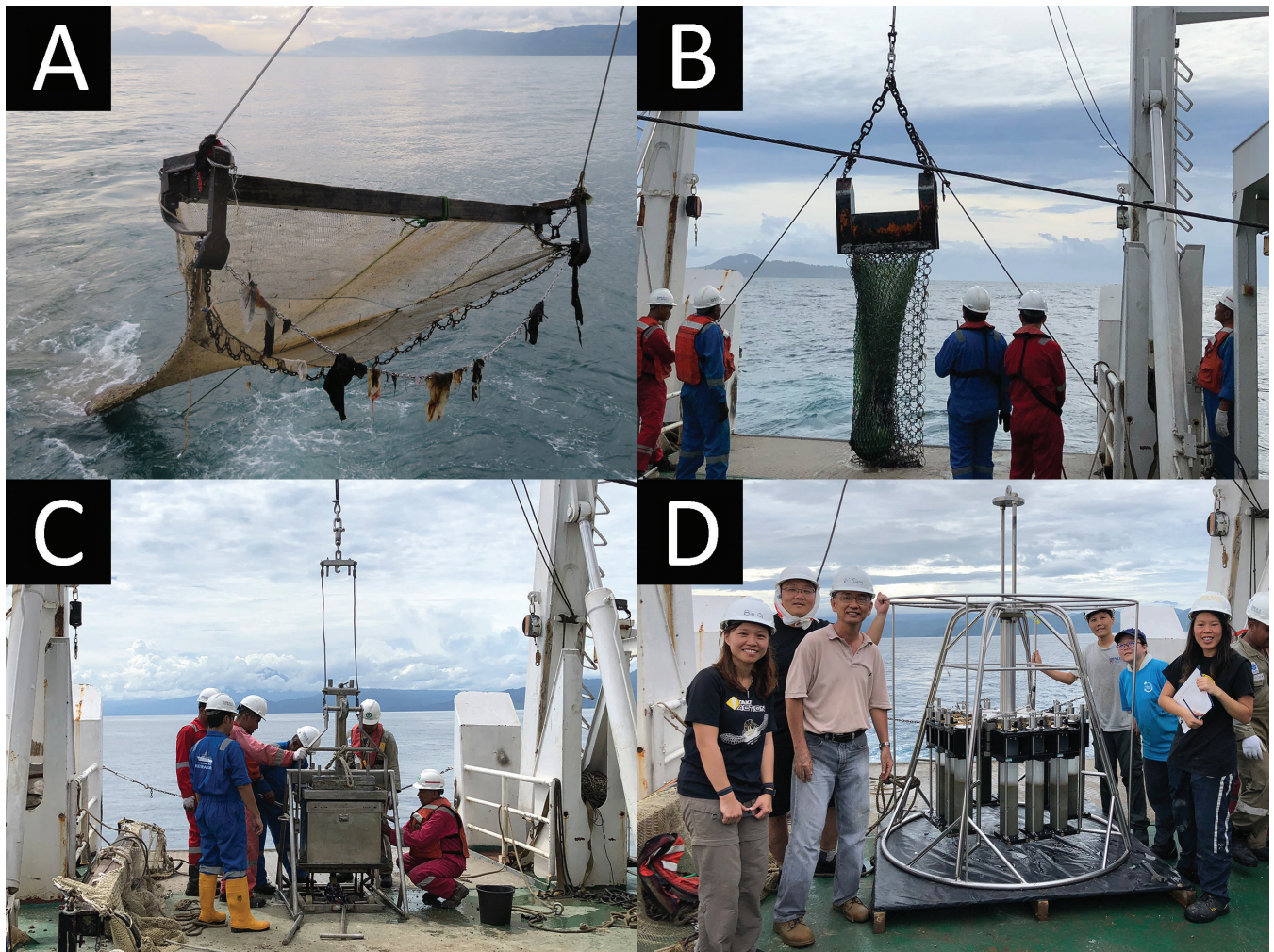


Fig. 1. Sampling instruments deployed during SJADES 2018: (A) beam trawl, (B) Warén dredge, (C) box corer, and (D) multiple corer.

was deployed and retrieved in the same manner as the box corer. After the corer was retrieved and secured on the deck, the tube cores were removed carefully and immediately processed. The contents of each tube were sectioned into 0–2 cm and 2–5 cm depth layers. Each layer was then sieved through a 40- μ m mesh size sieve with chilled, filtered seawater. Sediments retained on the respective layers and sieves were stored separately and fixed in ‘DESS’, a solution containing dimethyl sulfoxide, ethylenediamine tetra-acetic acid (EDTA), and saturated salt.

STATION DATA

There were a total of 63 sampling stations (Table 2), of which 21 stations were located in the Sunda Strait and 42 stations in the Indian Ocean between Panaitan Island and Cilacap in south Java (Fig. 2). The majority of the stations were in deeper waters between depths of 208–2,355 m. Six stations (i.e., DW01, DW16, DW19, CP37, CP56, and DW60) were in shallower waters between 92 m and 256 m.

The beam trawl (Fig. 1A) was the primary sampling instrument for this expedition and was deployed 44 times. The rectangular dredge (Fig. 1B) was deployed nine times while the box corer (Fig. 1C) and multiple corer (Fig. 1D) were deployed five times each.

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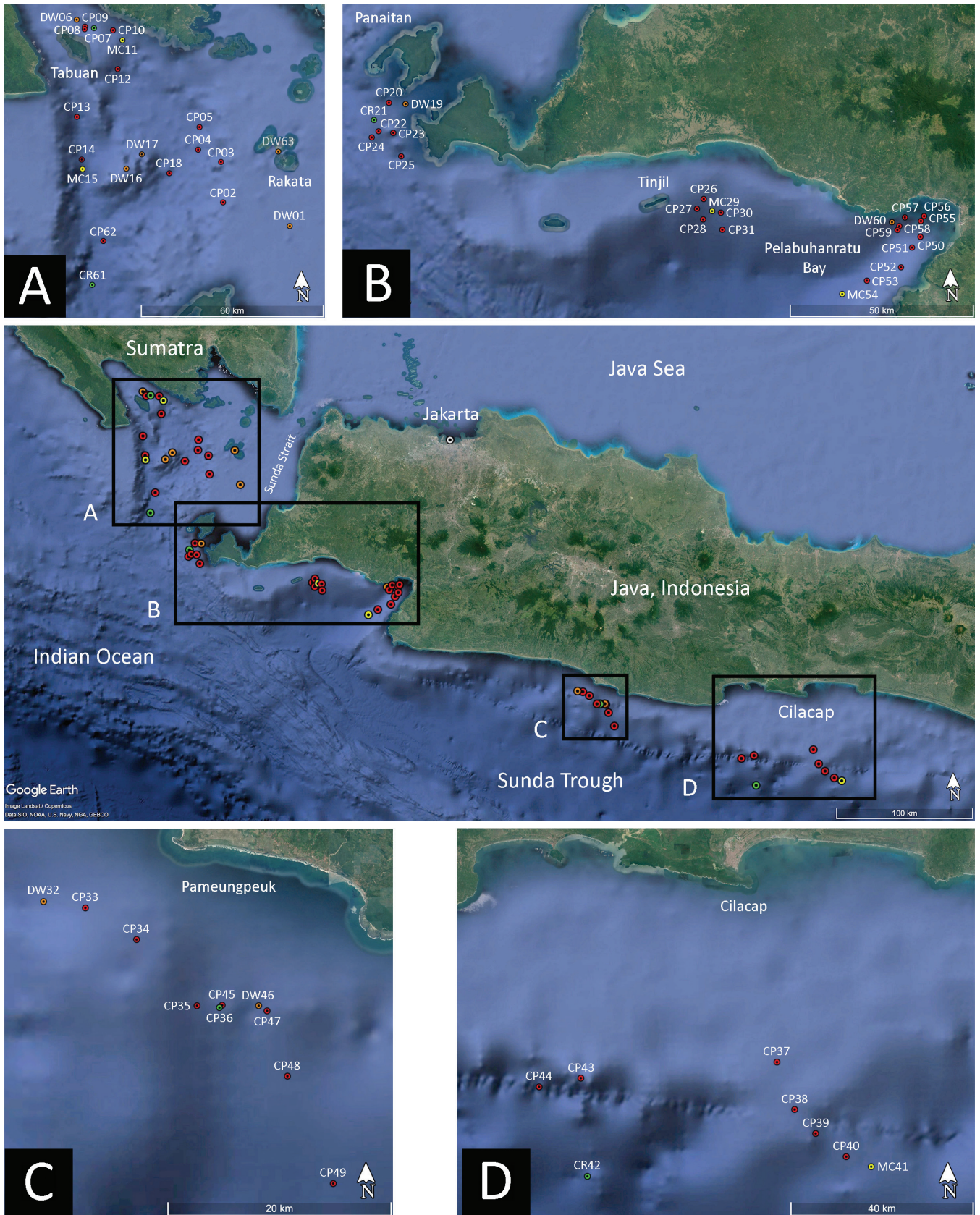


Fig. 2. Sampling stations of the SJADES biodiversity cruise. Insets A through D are enlarged and shown above and below the main map. (A) Sunda Strait; (B) between Panaitan and Pelabuhanratu Bay, (C) south of Pameungpeuk, and (D) south of Cilacap. Sampling instruments employed at each station: beam trawl (red), rectangular dredge (orange), box corer (green), and multiple corer (yellow). For depths of each station, see Table 2. This map was prepared in Google Earth Pro (ver. 7.3.3.7786).

Table 2. SJADES station data (for map, see Fig. 2). Stations were named according to the type of sampling instrument deployed: CP = beam trawl; CR = box corer; DW = Warén dredge; MC = multiple corer. Time was based on Jakarta time zone (UTC +9). Asterisk indicates failed deployment.

Station	Date	On bottom			Off bottom			Substrate		
		Time	Depth (m)	Latitude	Longitude	Time	Depth (m)		Latitude	Longitude
DW01	24 March	7:33	100	6° 20.489' S	105° 26.890' E	7:54	104	6° 20.431' S	105° 26.214' E	Mostly mud
CP02	24 March	10:02	257	6° 16.066' S	105° 15.053' E	10:54	281	6° 14.668' S	105° 15.256' E	Mostly mud with some clay
CP03	24 March	12:29	398	6° 08.941' S	105° 14.817' E	12:43	283	6° 08.590' S	105° 15.100' E	Mostly mud with some clay
CP04	24 March	15:40	850	6° 06.713' S	105° 10.783' E	16:10	870	6° 06.294' S	105° 09.931' E	Small clumps of mud
CP05	24 March	18:31	928	6° 02.737' S	105° 11.107' E	19:01	929	6° 03.229' S	105° 10.642' E	Very fine sand-mud
DW06	25 March	7:18	266	5° 43.413' S	104° 49.712' E	7:38	294	5° 43.779' S	104° 50.060' E	Mud and clay
CP07	25 March	8:32	379	5° 44.678' S	104° 51.151' E	9:01	409	5° 44.917' S	104° 52.061' E	Coarse sand, gravels, rubble and wood
CP08	25 March	11:50	425	5° 45.126' S	104° 51.080' E	12:12	442	5° 45.225' S	104° 51.710' E	Coarse sand, gravels and rubbles
CR09	25 March	13:48	377	5° 44.960' S	104° 52.731' E	13:48	377	5° 44.960' S	104° 52.731' E	Mud and clay
CPI0	25 March	15:03	429	5° 45.399' S	104° 56.098' E	15:29	446	5° 46.183' S	104° 56.565' E	Mud-clay and a large fallen wood
MC11	25 March	16:32	530	5° 47.181' S	104° 57.733' E	16:32	530	5° 47.181' S	104° 57.733' E	Mostly mud
CPI2	25 March	18:07	615	5° 52.252' S	104° 56.786' E	18:26	698	5° 52.728' S	104° 56.422' E	Mostly mud
CPI3	26 March	7:43	1259	6° 00.521' S	104° 49.410' E	7:54	1268	6° 00.828' S	104° 49.428' E	Some mud and plenty of plastic trash
CPI4	26 March	10:58	1528	6° 08.044' S	104° 50.086' E	11:18	1539	6° 08.518' S	104° 49.879' E	Some mud, fallen wood and plastic trash
MC15*	26 March	13:49	1577	6° 09.722' S	104° 50.209' E	13:49	1577	6° 09.722' S	104° 50.209' E	NA
DW16	26 March	15:41	103	6° 09.803' S	104° 57.976' E	15:51	92	6° 09.606' S	104° 58.208' E	Gravel, sand and mud
DW17	26 March	17:03	448	6° 07.333' S	105° 00.762' E	17:07	469	6° 07.221' S	105° 00.865' E	Gravel, coral rubble and small rocks
CPI8	26 March	18:59	1060	6° 10.758' S	105° 05.589' E	19:28	1073	6° 11.587' S	105° 05.735' E	Gravel, plastic trash and sunken wood
DW19	27 March	7:26	182	6° 42.551' S	105° 11.143' E	7:40	172	6° 42.762' S	105° 10.967' E	Mud and clay
CP20	27 March	8:47	325	6° 42.320' S	105° 08.682' E	9:08	362	6° 42.879' S	105° 09.018' E	Mud, gravel and many plastic trash
CR21	27 March	10:31	836	6° 44.791' S	105° 06.422' E	10:31	836	6° 44.791' S	105° 06.422' E	Mostly mud
CP22	27 March	11:48	864	6° 46.458' S	105° 07.068' E	12:17	870	6° 47.450' S	105° 07.613' E	Mostly mud
CP23	27 March	13:56	559	6° 46.739' S	105° 09.239' E	14:26	571	6° 45.924' S	105° 08.360' E	Gravel with some mud
CP24	27 March	16:10	1044	6° 47.344' S	105° 06.039' E	16:37	1068	6° 47.914' S	105° 06.485' E	Gravel with pieces of woods
CP25	27 March	18:14	876	6° 50.185' S	105° 10.353' E	18:44	937	6° 50.923' S	105° 10.776' E	Gravel and biogenic debris
CP26	28 March	7:34	517	6° 57.221' S	105° 54.754' E	8:07	727	6° 56.664' S	105° 55.315' E	Mostly mud
CP27	28 March	9:56	481	6° 58.624' S	105° 53.745' E	10:16	557	6° 58.937' S	105° 53.363' E	Gravel
CP28	28 March	11:58	957	7° 00.194' S	105° 54.624' E	11:28	1022	6° 59.778' S	105° 55.224' E	Coarse sand and some mud
MC29	28 March	13:53	1231	6° 59.000' S	105° 55.977' E	13:53	1231	6° 59.000' S	105° 55.977' E	Mostly mud
CP30*	28 March	15:14	1270	6° 59.265' S	105° 57.261' E	15:27	1341	6° 59.431' S	105° 57.476' E	NA

Station	Date	On bottom			Off bottom			Substrate		
		Time	Depth (m)	Latitude	Longitude	Time	Depth (m)		Latitude	Longitude
CP31	28 March	18:08	1763	7° 01.755' S	105° 57.422' E	18:35	1796	7° 01.911' S	105° 56.762' E	Small clumps of mud
DW32	29 March	9:09	977	7° 42.583' S	107° 34.535' E	9:29	805	7° 42.556' S	107° 35.030' E	Coarse sand and mud
CP33	29 March	10:49	525	7° 42.912' S	107° 36.559' E	11:19	312	7° 43.255' S	107° 37.234' E	Coarse sand and mud
CP34	29 March	12:23	243	7° 44.464' S	107° 39.018' E	12:45	234	7° 44.575' S	107° 39.447' E	Gravel with pieces of broken wood
CP35	29 March	14:02	603	7° 47.677' S	107° 41.904' E	14:24	686	7° 47.681' S	107° 42.477' E	Mud, clay and rocks
CR36	29 March	15:57	1114	7° 47.782' S	107° 42.991' E	15:57	1114	7° 47.782' S	107° 42.991' E	Mostly mud
CP37	30 March	13:03	163	8° 07.462' S	109° 05.639' E	13:34	166	8° 07.864' S	109° 06.470' E	Fine mud with pieces of small tree branches
CP38	30 March	14:50	290	8° 13.038' S	109° 07.689' E	15:10	295	8° 13.150' S	109° 08.216' E	No sediment
CP39	30 March	16:23	528	8° 15.885' S	109° 10.163' E	16:54	637	8° 16.060' S	109° 10.944' E	Some mud
CP40	30 March	18:23	1078	8° 18.642' S	109° 13.767' E	18:49	1091	8° 18.888' S	109° 14.476' E	Rock?
MC41	30 March	20:25	1239	8° 19.850' S	109° 16.743' E	20:25	1239	8° 19.850' S	109° 16.743' E	Mud with fine sand
CR42	31 March	7:55	2355	8° 20.609' S	108° 43.036' E	7:55	2355	8° 20.609' S	108° 43.036' E	Mud with fine sand
CP43	31 March	13:20	383	8° 09.092' S	108° 42.390' E	13:40	292	8° 08.903' S	108° 42.372' E	A piece of clay
CP44	31 March	17:33	1013	8° 10.065' S	108° 37.439' E	17:50	970	8° 09.802' S	108° 37.145' E	Mud with pieces of wood
CP45	1 April	7:49	851	7° 47.670' S	107° 43.126' E	8:16	684	7° 47.151' S	107° 43.595' E	Mud with pieces of wood
DW46	1 April	10:15	654	7° 47.716' S	107° 44.896' E	10:29	540	7° 47.905' S	107° 45.190' E	Mostly mud
CP47	1 April	11:51	530	7° 47.972' S	107° 45.298' E	12:14	476	7° 48.257' S	107° 45.706' E	Coarse sand
CP48	1 April	13:56	689	7° 51.120' S	107° 46.245' E	14:16	637	7° 51.718' S	107° 46.375' E	Some mud and fishing line
CP49	1 April	16:38	1531	7° 56.311' S	107° 48.408' E	17:08	1425	7° 56.321' S	107° 49.352' E	No sediment
CP50	2 April	10:40	383	7° 03.322' S	106° 26.673' E	11:05	425	7° 03.762' S	106° 26.334' E	Mostly mud
CP51	2 April	12:07	569	7° 04.874' S	106° 25.396' E	12:30	657	7° 05.348' S	106° 25.044' E	Coarse sand, mud and plastic trash
CP52	2 April	14:09	1156	7° 07.740' S	106° 23.719' E	14:29	1124	7° 07.819' S	106° 23.580' E	Mud, biogenic debris and plastic trash
CP53	2 April	17:25	1521	7° 09.610' S	106° 18.632' E	17:55	1714	7° 10.184' S	106° 17.714' E	Pieces of small wood
MC54	2 April	20:00	2086	7° 11.487' S	106° 14.967' E	20:00	2086	7° 11.487' S	106° 14.967' E	Fine mud
CP55	3 April	6:40	378	7° 01.013' S	106° 26.772' E	7:00	379	7° 01.116' S	106° 26.421' E	Clay and mud
CP56	3 April	8:06	183	7° 00.299' S	106° 27.247' E	8:25	255	7° 00.393' S	106° 26.790' E	Mostly mud
CP57	3 April	9:17	269	7° 00.429' S	106° 24.407' E	9:38	223	7° 00.455' S	106° 24.198' E	Mud, biogenic debris and plastic trash
CP58	3 April	11:10	564	7° 01.692' S	106° 23.558' E	11:31	505	7° 01.997' S	106° 23.258' E	Mostly mud
CP59	3 April	13:43	579	7° 02.252' S	106° 23.270' E	14:01	659	7° 02.668' S	106° 22.981' E	Mostly mud
DW60	3 April	15:55	161	7° 01.088' S	106° 22.477' E	16:10	256	7° 01.420' S	106° 22.289' E	Mud and plastic trash
CR61	4 April	6:43	1950	6° 30.151' S	104° 51.550' E	6:43	1950	6° 30.151' S	104° 51.550' E	Mostly mud
CP62	4 April	9:21	1623	6° 22.449' S	104° 53.654' E	9:41	1630	6° 22.279' S	104° 53.830' E	Mostly mud
DW63	4 April	16:01	250	6° 07.293' S	105° 25.076' E	16:22	208	6° 07.277' S	105° 25.725' E	Mostly mud