

OUTLINE OF THE RESEARCH CRUISE

The GH75-4 cruise was carried out in the Enshu-, Kumano-, and Hyuga-seas off southwest Japan for 22 days. The aim of the cruise was to clear the geological structure of the area and examine the Quaternary sedimentation. The results of the investigation are compiled in the geological map on a scale of 1:1,000,000.

Ship and personnel

The Hakurei-maru was chartered from the Metal Mining Agency for the research cruise. The specifications of the vessel are as follows:—

Length (o.a.)	86.95 m
Length (p.p.)	77.00 m
Breadth (mld.)	13.40 m
Depth (ml.)	5.30 m
Draft (ml.)	5.00 m
Gross tonnage	1,821.60 tons
Service speed	15.00 kt
Trial speed	17.78 kt
Endurance	15,000 sea-miles
Complement	55 persons
Officers and crew	35 persons
Scientists	20 persons
Main engine	3,800 ps 230 rpm 1 set
Main generator	600 kw 3 sets
Propeller	4 bladed variable pitch type 1 set
Special equipment	Bow thruster 1 set

The vessel was commanded by Captain Seiji TOKI and manned by thirty one officers and crew.

The scientific party consisted of seven scientists of the G. S. J. and several universities as listed in Table 1. In addition, two other scientists joined the cruise, Prof. Tetsuro HARADA from Wakayama University, and Dr. R. H. GRAPES from Hokkaido University, for a half term of the cruise.

Methods

The navigation and position fixing of all geophysical lines and sampling stations was done by Satellite and Loran-C navigation systems. Bathymetry was determined with a NS-16 type PDR of 12kHz. The geophysical survey of the cruise consisted of the measurements of gravity anomalies with the Air-sea gravitometer of Lacoste and Romberg Co., magnetic anomalies with a Proton magnetometer and a seismic reflection

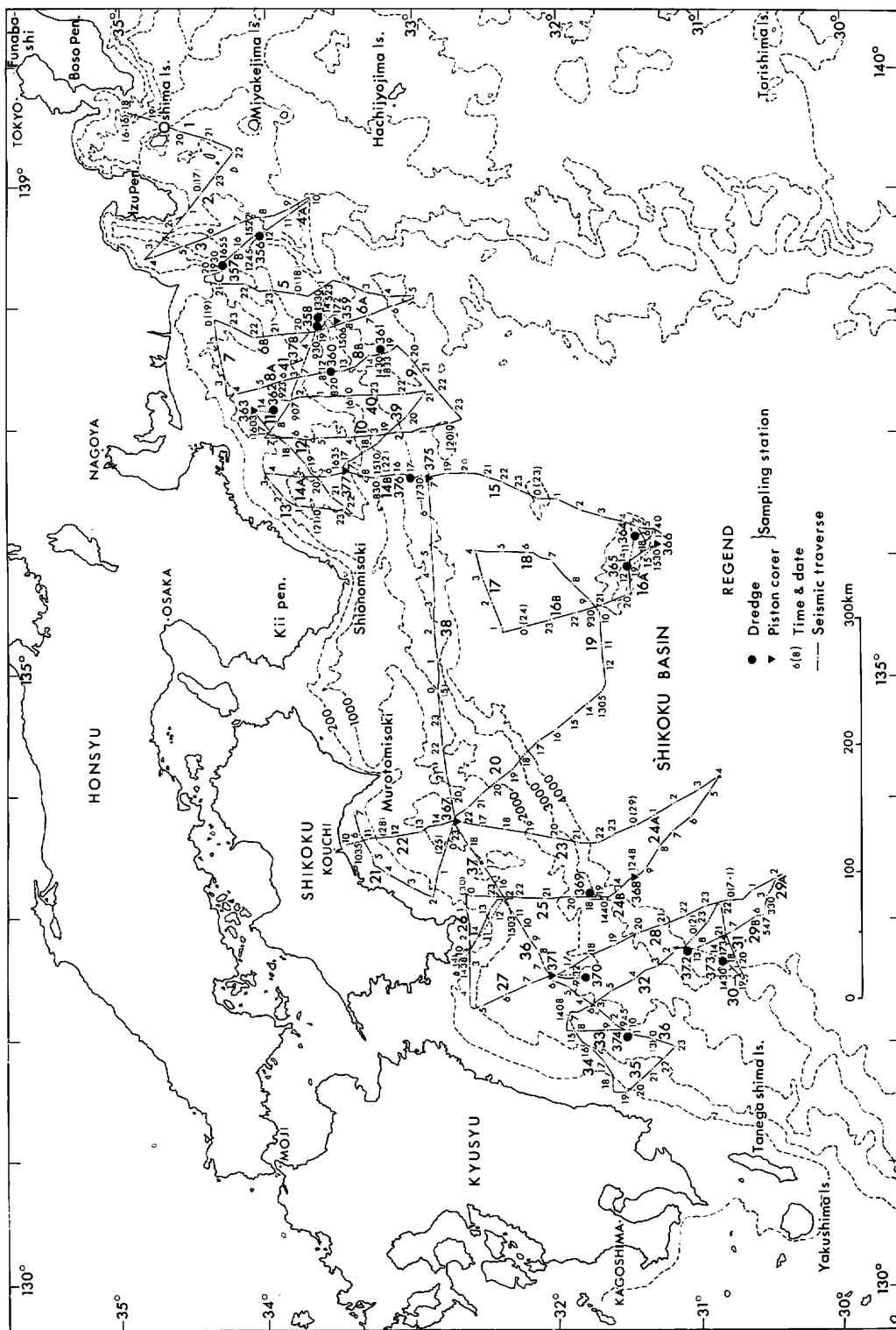


Fig. 2. Seismic traverses and sampling stations of GH75-4 cruise off southwest Japan.

Table 1 Scientific staff of the GH75-4 cruise.

Name	Organization	Speciality and work
Eiji INOUE	Geological Survey of Japan	Geologist, Chief scientist
Kaichi ISHIBASHI	G.S.J.	Topographer, PDR
Takemi ISHIHARA	G.S.J.	Geophysicist, NNSS and gravity measurement
Yasumasa KINOSHITA	G.S.J.	Geologist, Sampling
Yoshihisa OKUDA	G.S.J.	Geologist, Seismic survey
Kensaku TAMAKI	G.S.J.	Geologist, Seismic survey
Masato JOSHIMA	G.S.J.	Geophysicist, Magnetic measurement
Tomio KURODA	Kyushu University	Master course student, Palynology
Shogo MINETOMA	ditto	Student
Yasuhiko KOMAKI	Wakayama University	Student
Akihito MIYAMOTO	ditto	Student
Yoshio ASAI	Nara-Kyoiku University	Student
Yoshihiko OKAZAKI	Kyoto University	Doctor course student, Paleontologist
Tetsuro HARADA	Wakayama University	Professor, Geologist
R. H. GRAPES	Hokkaido University	Geologist, Petrology

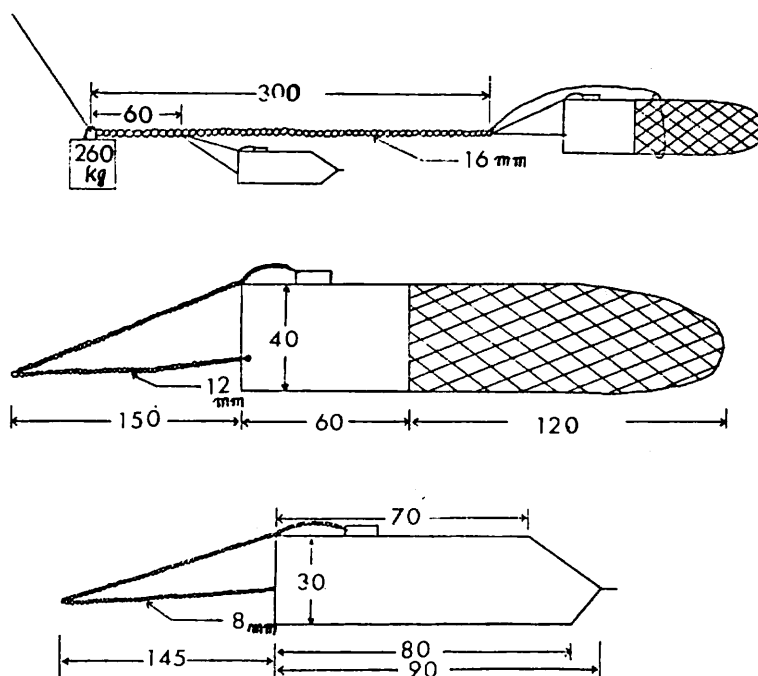


Fig. 3 Dimensions of cylinder-type dredge and chain-bag dredge used in GH75-4 cruise and connection of both the dredges.

Table 2 Sampling work log

Data	St. No.	Tool	Area, Topography	Ship positions				Depth (m)		
				Hit		Lift off		Start	Hit	Lift
				Lat. N	Long. E	Lat. N	Long. E			
June										
17	356	D	Slope of ridge off Suruga Bay	34°02.6	138°35.5	34°03.4	138°36.0	2,600	2,570	2,580
17	357	C & D	Kinsu Shoal Enshunada	34°17.9	138°22.2	34°17.6	138°21.0	1,650	1,440	1,100
18	358	C & D	Slope of Nankai trough	(33°33.9)	(137°55.0)	—	—	3,800	3,750	—
18	359	P	Bottom of the Trough	—	—	—	—	4,060	—	—
19	360	C & D	North slope of trough	33°34.2	137°27.5	33°33.5	137°28.8	3,870	3,930	3,930
19	361	C & D	Slope & top of seamount	33°13.4	137°39.1	33°13.5	137°40.5	3,740	3,400	2,950
20	362	C & D	Slope of the trough	33°57.0	137°10.7	33°56.9	137°10.1	1,890	1,907	1,810
20	363	P	Small depression	34°04.3	137°09.8	—	—	1,800	1,775	1,775
23	364	C & D	Slope of Koshu Seamount	31°26.0	136°08.2	31°27.2	136°08.8	3,550	3,560	3,440
23	365	C & D	Slope of Koshu Seamount	31°30.6	135°53.8	31°30.6	135°53.6	3,150	2,920	2,920
23	366	P	Top of hill near Koshu Mt.	31°19.0	136°05.4	—	—	4,030	4,000	4,000
28	367	P	Plain of Tosa Terrace, off Tosa	32°43.0	133°48.5	—	—	1,080	1,080	1,080
29	368	P	Margin of Nankai Trough	31°26.9	133°20.5	—	—	4,890	4,890	4,890
29	369	C & D	Slope north of Nankai Trough	31°45.7	133°12.0	31°46.0	133°12.7	2,740	2,650	2,500
30	370	C & D	Continental slope Hyuganada	31°49.0	132°30.8	31°50.0	132°31.0	2,270	2,265	2,220
30	371	P	Terrace Hyuganada	32°02.5	132°31.8	—	—	1,800	1,780	1,780
30	371	CM	ditto	32°02.4	132°31.5					
July										
1	372	C & D	Lower part of slope Hyuganada	31°06.9	132°43.9	31°06.9	132°44.5	4,750	4,820	4,720
1	373	C & D	No. 1 Komabashi Seamount	30°51.2	132°37.5	30°52.0	132°39.0	3,500	3,030	2,800
2	374	C & D	Slope, Hyuganada	31°31.8	132°04.0	31°31.5	132°03.4	1,620	1,580	1,600
5	375	P	Kumanonada bottom of trough	32°53.7	136°36.6	—	—	4,430	4,440	4,440
5	376	C & D	Kumanonada Slope	33°00.9	136°36.4			3,420	3,550	3,550
5	377	P	Kumanonada bottom of basin	33°28.0	136°40.5	—	—	2,050	2,050	2,050
6	378	C & D	Enshunada slope of outer ridge	33°39.0	137°50.8	33°39.0	137°52.2	3,800	3,780	3,780

of the GH75-4 Cruise.

Start	Time				Duration (min)	Wire-out (m)		Wire angle	Sample No.	Sample	Operator	Remarks
	Hit	Lift	Fin- ish			Hit	maxi- mum					
1336	1411	1438	1506	27	2,612	2,672	4°	D108	Silt	Y. Kinoshita	Weather quiet	
1731	1753	1840	1856	47	1,780	1,833	15°	D109	Rock frg. cobbles	"	ditto	
1012	1158	—	1326	—	4,840	4,840	35°	—	no	"	Not touch bottom	
1506	—	—	1709	—	—	3,940	35°	—	no	"	Very rough sea condi.	
0853	0947	1031	1121	46	4,353	4,347	15°	D110	Silt	"		
1551	1633	1731	1803	58	3,560	3,611	15°	D111	Basalt, manganese	"	max tension 3.5 t	
1013	1036	1116	1136	40	1,907	1,962	14°	D112	Silt, sed. rock, tuff.	"	Weather quiet	
1454	1520	1521	1549	1	1,761	1,761	0°	P57	Silt, tuff	"	ditto	
0803	0849	0937	1033	47	3,630	3,706	17°	D113	Manganese nodules	"		
1222	1300	1327	1400	27	3,160	3,190	4°	D114	Silt, ooze	"		
1545	1638	1638	1730	0	4,012	4,012	0°	P58	Red clay, tuff, silt	"		
1458	1515	1516	1540	1	1,067	1,067	0°	P59	Silt & v. f sd	"		
0949	1055	1057	1215	2	4,895	4,895	0°	P60	Silt & tuff	"		
1544	1620	1710	1738	50	2,818	2,871	18°	D115	Tuff rock, red clay	"	Temp. mud -0.2°C	
0930	0957	1118	1132	81	2,257	2,410	0°	D116	Silt	"	Temp. mud +0.2°C	
1153	1217	1218	1400	2	1,774	1,774	0°	P61	m. sand & shell bed	"		
1412	1452	1520	1600	28						"		
0906	1008	1130	1230	82	5,043	5,256	16°	D117	Grey clay & sed. rock frag.	"	Temp. mud -0.2°C	
1443	1525	1637	1709	72	3,553	3,611	14°	D118	Brown clay & g. clay	"	Temp. mud -0.5°C	
1021	1042	1105	1133	23	1,770	2,019	35°	D119	Sdy silt, deepsea fish	"		
0810	0909	0910	1010	1	4,447	4,447	0°	P62	Silt and sandy silt	"		
1100	1153	1250	1329	57	3,550	3,550	18°	D120	Blue g. silt	"		
1532	1604	1604	1635	0	2,071	2,071	0°	P63	Silt and tuff	"		
0804	0859	0949	1038	50	4,525	4,800	30°	D121	Silt and mudstone	"		

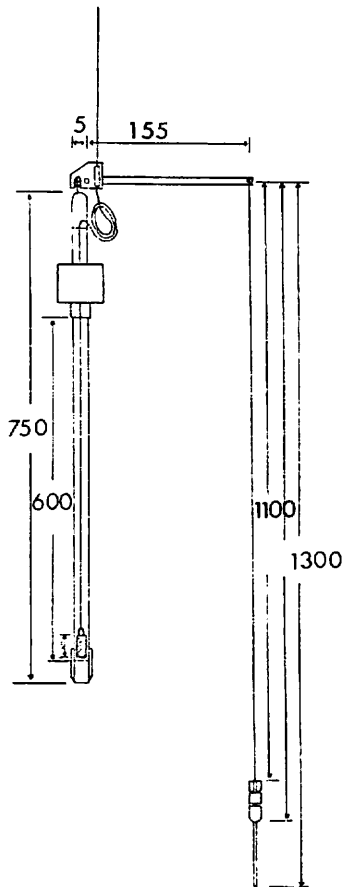


Fig. 4 Piston corer used in GH75-4 cruise.

survey with air-gun equipment having 120 in³ air-firing at 2000 p.s.i.g. The 3.5kHz profiler was used for the surface sediment survey. Traverses for the seismic survey were made during a zig-zag course across the continental slope and the Nankai Trough as shown in Fig. 2. The central part of the area was not surveyed in detail because of the many geophysical records obtained previously by other institutes. The ship speed was generally held at ten knots during the seismic survey.

The geophysical survey was mostly carried out by night and sampling work was done during the day.

Rocks of sea bed were dredged with both chain-bag and cylinder-type dredges (Fig. 3). The dredges were usually operated at the shoulders on the slopes and the ridges. Dredging times were from 27 to 82 minutes (Table 2). Soft sediment cores were taken with a piston corer of 6 m length (Fig. 4).

Progress of the work

The Hakurei-maru sailed from Port Funabashi on the 16th of June and surveyed the area of the Enshu-and Kumano-seas for 10 days, in which a half day was spent for

Table 3 Progress of the GH75-4 cruise.

Date	Weather	Works
June 16	Cloud	Left Funabashi Port. Sailed to the area surveyed
17	Cloud and bright	Seismic survey and sampling work
18	Cloud	ditto
19	Cloud	ditto
20	Cloud	ditto
21	Rough condition	Geophysical survey and sheltered to Katsuura
22	Rain	Geophysical survey
23	Cloud and bright	Geophysical survey and sampling work
24	Rough condition	Geophysical survey
25	Cloud	Geophysical survey and dropped into Kouchi Port
26	Cloud	Personnel change at Kouchi Port
27	Bright	Water supply
28	Cloud and bright	Started Kouchi, geophysical survey and sampling
29	Cloud	Geophysical survey and sampling work
30	Cloud and bright	ditto
July 1	Cloud	ditto
2	Rain	ditto
3	Rough condition	Geophysical survey and sheltered to Sukumo
4	Bright	Geophysical survey
5	Cloud	Geophysical survey and sampling work
6	Bright and cloud	Geophysical survey and sampling work
7	Bright	Arrived at Funabashi Port

shelter from very rough sea condition at port Katsuura. The vessel anchored at Kouchi Port on the 26th and the 27th of June for personnel change and water supply. From the 28th of June to the 6th of July the vessel surveyed in the area of the Hyuga-sea and arrived at Port Funabashi on the 7th. The progress of the cruise is summarized in Table 3.

Data obtained

Sailing distance	3348.2 sea miles
Seismic reflection traverses	2983 sea miles
Total of sampling stations	23 (St. 356-378)
Dredged samples	14 (D 108-121)
Core samples	7 (P 57-63)
Undersea-camera observation	1 (St. 371)