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PART I

I. OUTLINE OF THE GH80–5 CRUISE

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Introduction

The Geological Survey of Japan (GSJ) has carried out, since F.Y. 1979, the special research program, "Geological Study of Deep-sea Mineral Resources", funded by the Agency of Industrial Science and Technology, MITI. We may call this program the second five-year program on the study of manganese nodules in the Central Pacific, referring the previous (first) five-year program, "Basic Study on Exploration of Deep-sea Mineral Resources", carried out from F.Y. 1974 to F.Y. 1978. Through the first five-year program, we disclosed general view of the manganese nodule distribution in the southwest of Hawaii. The data obtained, however, is not adequate to interpret geological factors controlling the variations in metal grade and abundance of the nodules, because we covered so vast area (latitudinal 880 km × longitudinal 2,100 km) by a rough, 110 km grid. Though the scale of geological phenomena in the midst of the Pacific is, of course, much larger than around the Japanese Islands, the Deep Sea Drilling Project has discovered rather unsteady sedimentation history with sedimentary hiatus in the oceans, mainly in 1970's. We also have been recognizing so local variations of various properties of manganese nodules and sediments that could not be understood under the scale of 110 km grid in the area of the first five-year program. A few examples of such local variation are described in MIZUNO (1981) for GH79–1 cruise.

Standing on the viewpoints mentioned above, we designed the second five-year program aiming to cralify geological factors which controlls the regional and local variation of various properties to manganese nodules. For the first year of that, we selected the survey area which includes Mid-Pacific Mountains, Central Pacific Basin, Manihiki Plateau and Pennhyn Basin, along the Wake-Tahiti Transect in order to cralify the regional aspect of the theme. MIZUNO and NAKAO (1982) reported the results of on-board and some on-shore works, for the first year activity, GH80–1 cruise.

As to cralifying the local aspect, we designed our program to select one or two small areas in each one fourth of the Wake-Tahiti Transect, from north to south, for each fiscal year or cruise. For the F.Y. 1980 namely second year of this five-year program or the first year focussing the local aspects, we selected two detailed survey areas in the northern vicinity of Magellan Trough (Figs. I–1 and I–2). Detailed Survey Area I is located in the northernmost part of the Central Pacific

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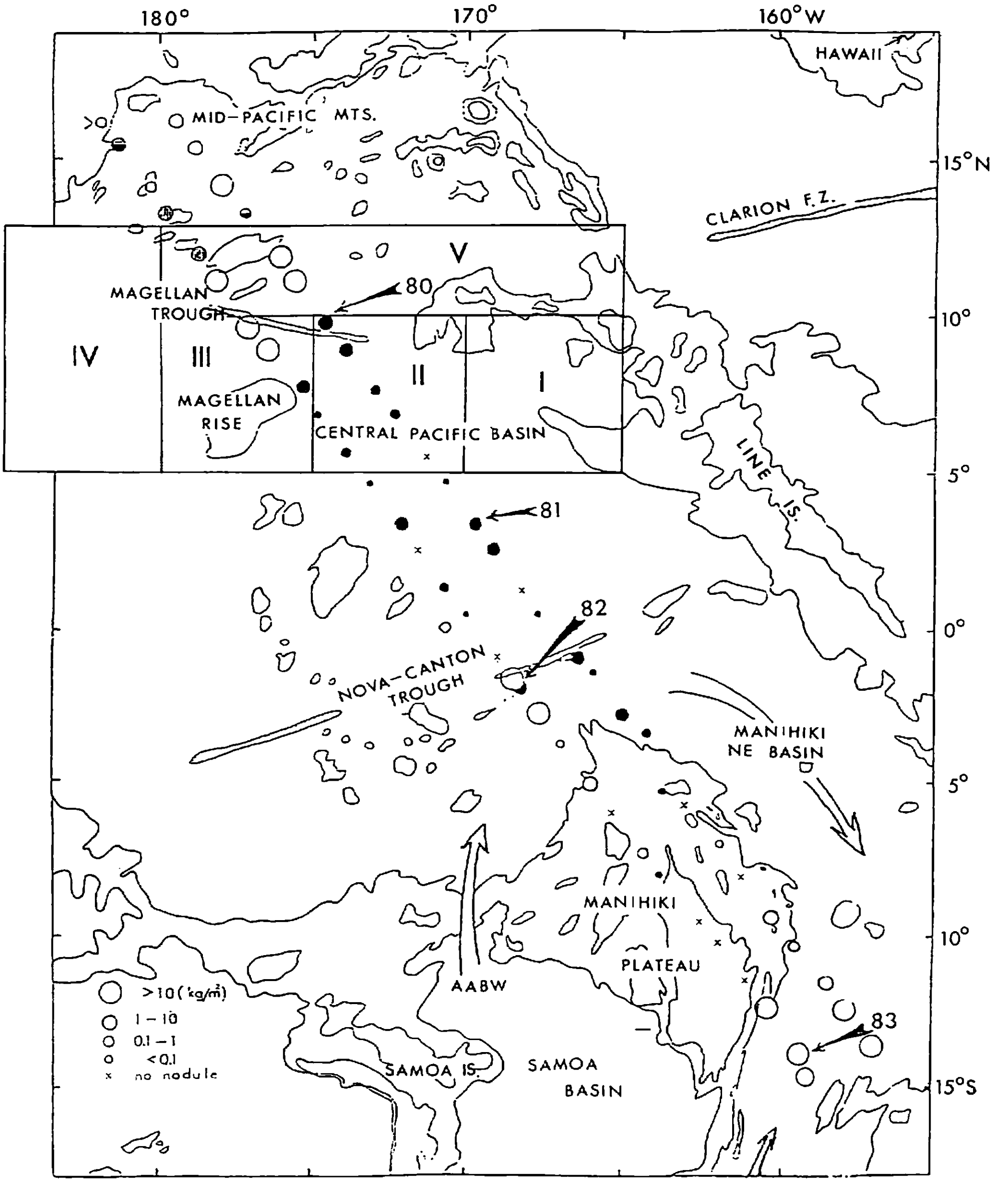
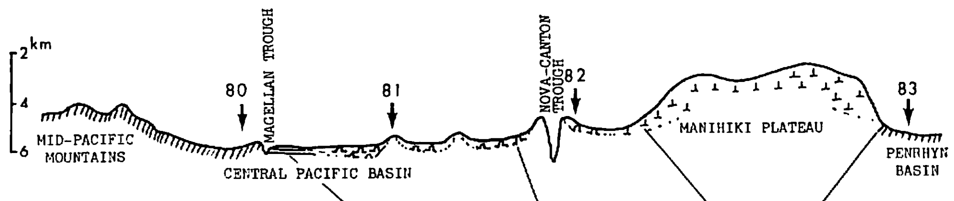


Fig. I-1 Regional view of survey areas of the first and the second five-year program. I : GH74-5 area, II : GH76-1 area, III : GH77-1 area, IV : GH78-1 area and V : GH79-1 area. Two disits (80-83) with an arrow show the detailed survey area(s) in each fiscal year in 1980's including those scheduled. Circles show surface feature and abundance of the nodules at the sites in GH80-1 area. Solid circle : rough surface nodule, open circle : smooth surface nodule, vertically striped circle : intermediate surface nodule, a circle with solid bottom and striped top : a nodule with rough surface bottom and intermediate surface top.



Topography	Borderland between Mid-Pac. Mts. and deep-sea basin with a small trough	Deep-sea basin with scattered hills	Margin of plateau with a big trough	Plateau	Deep-sea basin
Sediments	Pelagic and zeolitic clays with surface siliceous clay	Siliceous ooze	Siliceous and calcareous ooze	Calcareous ooze	Pelagic and zeolitic clays

Fig. I–2 Regional view of survey areas in the second five year program (1979–1983) with the idealized submarine topography. Two disits (80–83) with an arrow show the detailed survey area(s) in each fiscal year in 1980's including those scheduled.

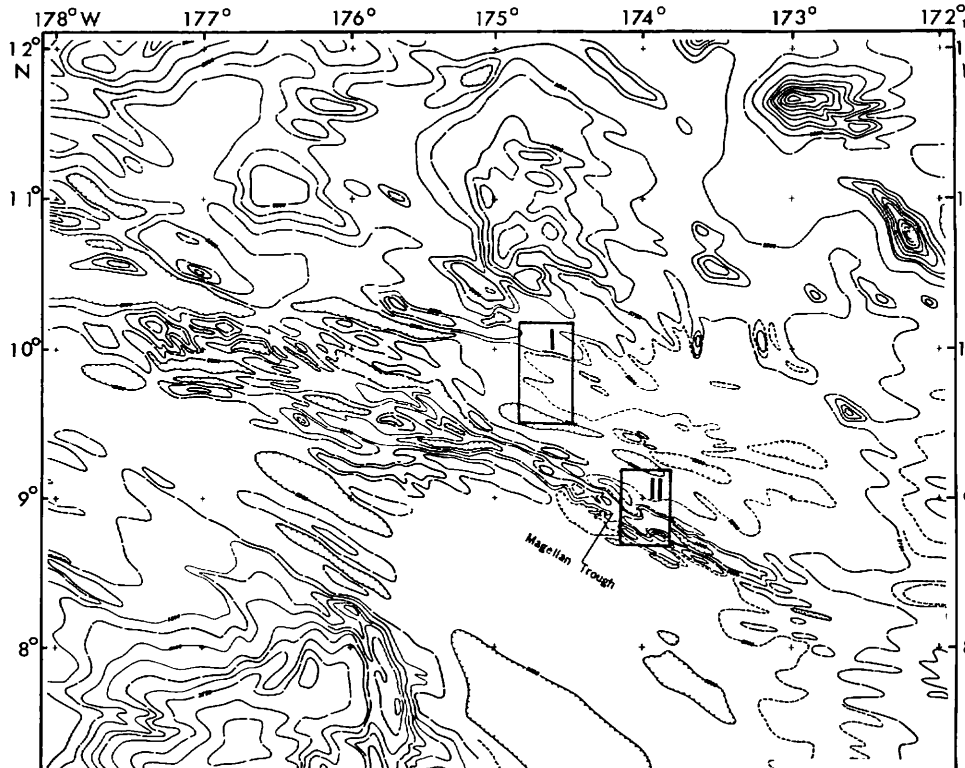


Fig. I–3 Detailed survey areas with their topographic background.

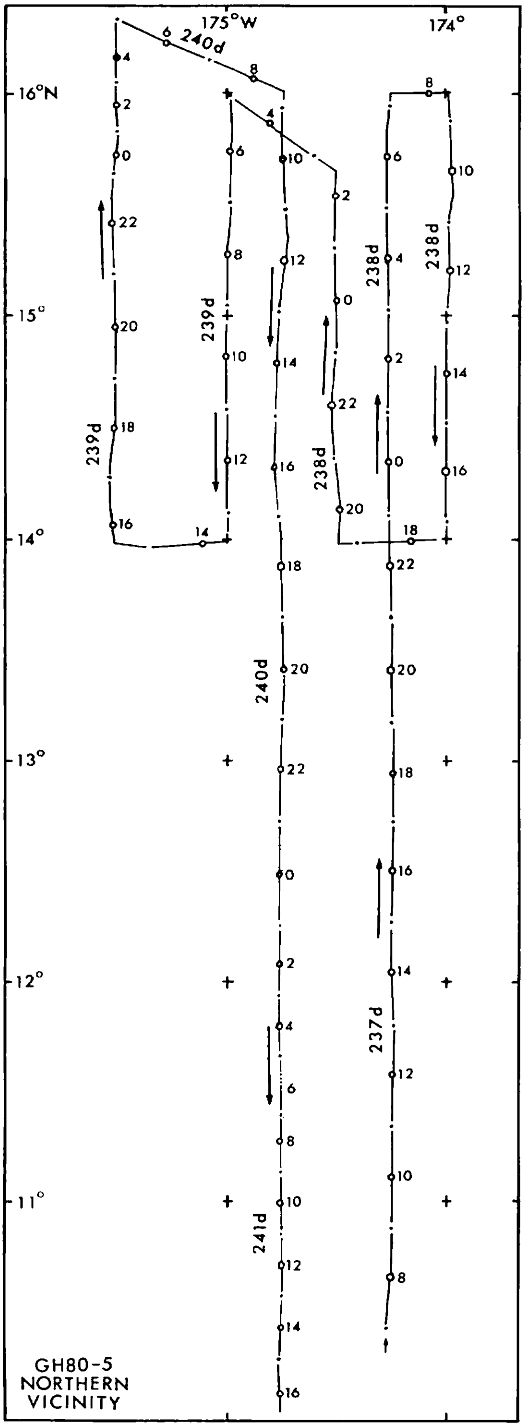


Fig. I–4(1) Tracks of geophysical works in the northern vicinity.

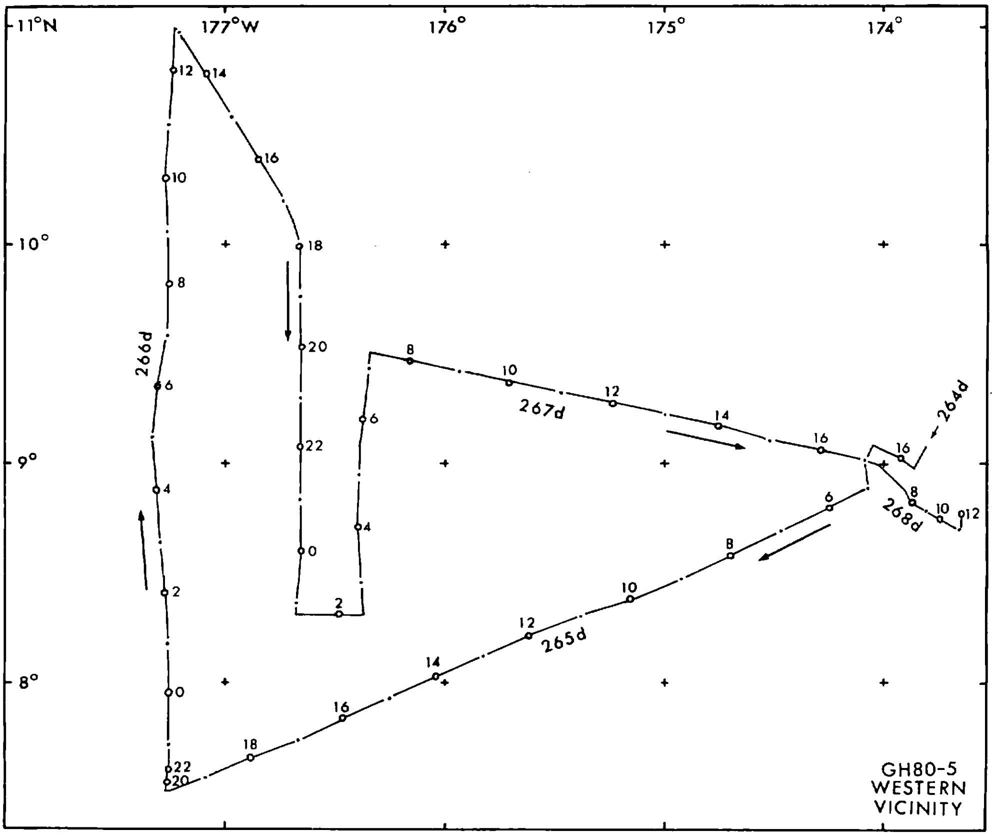


Fig. I-4(2) Tracks of geophysical works in the western vicinity.

Basin, including southern foot of a seamount and bounded by the latitudes 9°30′N and 10°N, and the longitudes 174°30′W and 174°50′W, while Detailed Survey Area II covers Magellan Trough and its northern and southern borderlands, and bounded by the latitudes 8°40′N and 9°10′N, and the longitudes, 173°50′W and 174°10′W (Fig. I–3). Some geophysical works were carried out in the northern and western vicinities (Fig. I–3) of the detailed survey areas. Tracks in these areas are shown in Figs. I–4 (1) and (2).

Outline of GH80–5 cruise

Participants of the present cruise were nine scientists from GSJ*, NRIPR**, and MMAJ***, ten graduate and undergraduate students as technical assistants from five universities (Table I–1).

The R/V Hakurei-Maru commanded by Captain H. Okumura sailed from Funabashi Port, Tokyo Bay on 11th of August, 1980, made various surveys and observations in the survey area of the Central Pacific, called Hilo and Honolulu Ports, Hawaiian Islands for 8 days in total, and returned to Funabashi on the 9th of October of the same year (Fig. I–5).

Table I-1 On-board acientific staffs

Name	Organization	Speciality and/or responsibility
Seizo Nakao	G.S.J.	Chief scientist; geology
Koji Onodera	G.S.J.	Co-chief scientist; topography
Kensaku Tamaki	G.S.J.	Scientist; magnetic and acoustic survey
Masato Joshima	G.S.J.	Scientist; gravimetric survey, NNSS possitioning and heat-flow measurement
Akira Usui	G.S.J.	Scientist; geochemistry and mineralogy
Akira Nishimura	G.S.J.	Scientist; sedimentoloty
Katsuya Tsurusaki	N.R.I.P.R.	Senior scientist; exploitation techniques of nodules and engineering property of sediments
Tadaaki Ezawa	M.M.A.J.	Scientist; survey techniques
Naotaka Adachi	M.M.A.J.	Scientist; survey techniques
Shoji Mishima	Ryukyu Univ.	Undergraduate student; technical assistant
Masaaki Watanabe	Ryukyu Univ.	*Ibid.*
Hiroshi Kazama	Ryukyu Univ.	*Ibid.*
Kenta Sasaki	Ryukyu Univ.	*Ibid.*
Satoru Yamaguchi	Kobe Univ.	*Ibid.*
Yoshikazu Matsubara	Kobe Univ.	*Ibid.*
Nobuyoshi Takahashi	Chiba Univ.	*Ibid.*
Nobuhiko Yoshimura	Chiba Univ.	*Ibid.*
Kokichi Iizasa	Univ. of Tokyo	Graduate student; technical assistant
Haruyuki Kita	Kyoto Univ.	*Ibid.*

Table I-2 Rough summary of cruise program

Aug. 11	Lv.	Funabashi (13:00)
		Geophysical survey from off Boso Peninsula to the survey area.
Aug. 19	Ar.	the survey area.
		Geological and geophysical survey.
Aug. 31	Lv.	the survey area.
		Geophysical survey from the survey area to Honolulu.
Sept. 5	Ar.	Honolulu (09:00).
Sept. 8	Lv.	Honolulu (16:00).
Sept. 9	Ar.	Hilo (09:00).
Sept. 12	Lv.	Hilo (16:00).
		Geophysical survey to the survey area.
Sept. 17	Ar.	the survey area.
		Geophysical and geological survey.
Sept. 28	Lv.	the survey area.
		Geophysical survey from the survey area to Funabashi.
Oct. 9	Ar.	Funabashi (10:00).

The roughly summarized program and the detailed program of sixty days of the cruise are shown in Tables I–2 and I–3 respectively.

Survey methods and onshore laboratory works

The survey methods used in the survey area are shown in Table I–4. The length of the survey lines for some geophysical works (bathymetric, magnetic and gravimetric surveys) includes those along the cources between Japan and the survey area, and

Table I-3 Daily program of cruise

Date	Weather	Cruising time	Cruising distance	Remarks
Aug. 11	Fine	11.00	144.1 n.m.	Lv. Funabashi (13:00).
12	Fine	23.30	323.7	Geophysical survey (2)* to the survey area.
13	Cloudy	23.30	321.9	Geophysical survey (2) to the survey area.
14	Fine	23.30	349.9	Geophysical survey (2) to the survey area.
15	Fine	23.30	331.4	Geophysical survey (2) to the survey area.
16	Fine	23.30	340.1	Geophysical survey (2) to the survey area.
17	Fine	23.30	324.7	Geophysical survey (2) to the survey area.
18	Fine	24.00	330.8	Geophysical survey (2) to the survey area.
19	Fine	24.00	331.4	Geophysical survey (2) to the survey area.
19	Fine	24.00	232.5	Geophysical survey (1) and sampling**(St. 1979).
20	Rainy	24.00	124.0	Geophysical survey (1) and sampling (Sts. 1980, 1981 and 1982).
21	Rainy	24.00	124.0	Geophysical survey (1) and sampling (Sts. 1983, 1984 and 1985).
22	Fine	24.00	129.1	Geophysical survey (1) and sampling (Sts. 1986, 1987 and 1988).
23	Fine	24.00	178.2	Geophysical survey (1) and sampling (Sts. 1989, 1990 and 1991).
24	Fine	24.00	327.8	Geophysical survey (1) in the northern adjacent area.
25	Fine	24.00	334.2	Geophysical survey (1) in the northern adjacent area.
26	Fine	24.00	285.4	Geophysical survey (1) in the northern adjacent area.
27	Fine	24.00	273.8	Geophysical survey (1) in the northern adjacent area.
28	Fine	24.00	149.1	Geophysical survey (1) and sampling (Sts. 1992–1999).
29	Cloudy	24.00	136.7	Geophysical survey (1) and sampling (Sts. 2000–2007).
30	Fine	24.00	127.5	Geophysical survey (1) and sampling (Sts. 2008–2015).
31	Cloudy	23.30	158.6	Geophysical survey (1) and sampling (Sts. 2016 and 2011A).
Sept. 1	Cloudy	23.30	338.8	Geophysical survey (2) to Honolulu.
2	Fine	23.30	326.3	Geophysical survey (2) to Honolulu.
3	Cloudy	23.30	308.7	Geophysical survey (2) to Honolulu.
4	Fine	24.00	299.9	Geophysical survey (2) to Honolulu.
5	Fine	09.00	65.8	Ar. Honolulu. (09:00).
6	Cloudy	—	—	—
7	Fine	—	—	—
8	Fine	08.00	102.8	Lv. Honolulu (16:00).
9	Fine	09.30	99.6	Ar. Hilo (09:30).
10	Cloudy	—	—	—
11	Cloudy	—	—	—
12	Fine	08.30	118.0	Lv. Hilo (16:00).
13	Fine	24.30	365.6	Geophysical survey (2) to the survey area.
14	Fine	24.30	356.8	Geophysical survey (2) to the survey area.
15	Fine	24.30	360.6	Geophysical survey (2) to the survey area.
16	Fine	24.00	356.1	Geophysical survey (2) to the survey area.
17	Fine	24.00	178.6	Geophysical survey (1) and sampling (Sts. 2017, 2018 and 2019).
18	Rainy	24.00	143.8	Geophysical survey (1) and sampling (Sts. 2020, 2021 and 2022).
19	Fine	24.00	145.6	Geophysical survey (1) and sampling (Sts. 2023, 2024 and 2025).

Table I-3 (continued)

Date	Weather	Cruising time	Cruising distance	Remarks
Sept. 20	Rainy	24.00	165.3 n.m.	Geophysical survey (1) and sampling (Sts. 2026, 2027 and 2028).
21	Cloudy	24.00	303.8	Geophysical survey (2) in the western adjacent area.
22	Fine	24.00	340.9	Geophysical survey (2) in the western adjacent area.
23	Fine	24.00	120.5	Geophysical survey (1) and sampling (Sts. 2029-2034).
24	Rainy	24.00	87.9	Geophysical survey (1) and sampling (Sts. 2035-2040).
25	Fine	24.00	117.6	Geophysical survey (1) and sampling (Sts. 2041-2046).
26	Cloudy	24.00	177.1	Geophysical survey (1) and sampling (Sts. 2047 and 2048).
27	Rainy	24.00	184.6	Geophysical survey (1) and sampling (Sts. 2049 and 2050).
28	Cloudy	24.00	340.0	Lv. the survey area, geophysical survey (2) to Funabashi.
29	Fine	24.00	340.9	Geophysical survey (1) to Funabashi.
Oct. 1	Fine	24.30	255.0	Geophysical survey (1) to Funabashi.
2	Fine	24.30	257.4	Geophysical survey (1) to Funabashi.
3	Fine	24.30	345.0	Geophysical survey (2) to Funabashi.
4	Fine	24.30	349.8	Geophysical survey (2) to Funabashi.
5	Rainy	24.30	286.6	Geophysical survey (2) to Funabashi.
6	Rainy	24.30	344.1	Geophysical survey (2) to Funabashi.
7	Rainy	24.00	339.1	Geophysical survey (2) to Funabashi.
8	Cloudy	18.30	239.5	Geophysical survey (2) to Funabashi.
9	Cloudy	01.20	7.1	Ar. Funabashi (10:00).

* Geophysical survey (1) comprises continuous seismic reflection profiling, and magnetic and gravity measurements. Geophysical survey (2) means the survey with magnetic measurement and gravity measurement.

** Sampling includes bottom photographing by a one-shot camera installed with a box corer or a freefall grab sampler, and heat-flow measurement.

Table I-4 Survey methods in the GH 80-5 area. The right-hand column shows a survey line length and an observation number of respective works

Cruising and positioning by NNSS	
Geophysical methods	
Bathymetric survey by 12kHz PDR	16,535km (8,929n.m.)
Subbottom profiling by 3.5kHz SBP	23,443km (12,659n.m.)
Continuous seismic reflection profiling by air-gun	5,456km (2,946n.m.)
Seismic refraction survey by sono-buoy (4 sites)	72km (39n.m.)
Magnetic survey by proton magnetometer	23,172km (12,513n.m.)
Gravimetric survey by on-board gravimeter	24,021km (12,971n.m.)
Heatflow measurement	H36-51
Geological methods	
Bottom sampling by box corer	B33-56
Bottom sampling by piston corer	P192-208
Bottom sampling by freefall grab with camera	FG252-309
Bottom sampling by dredge	D463-465

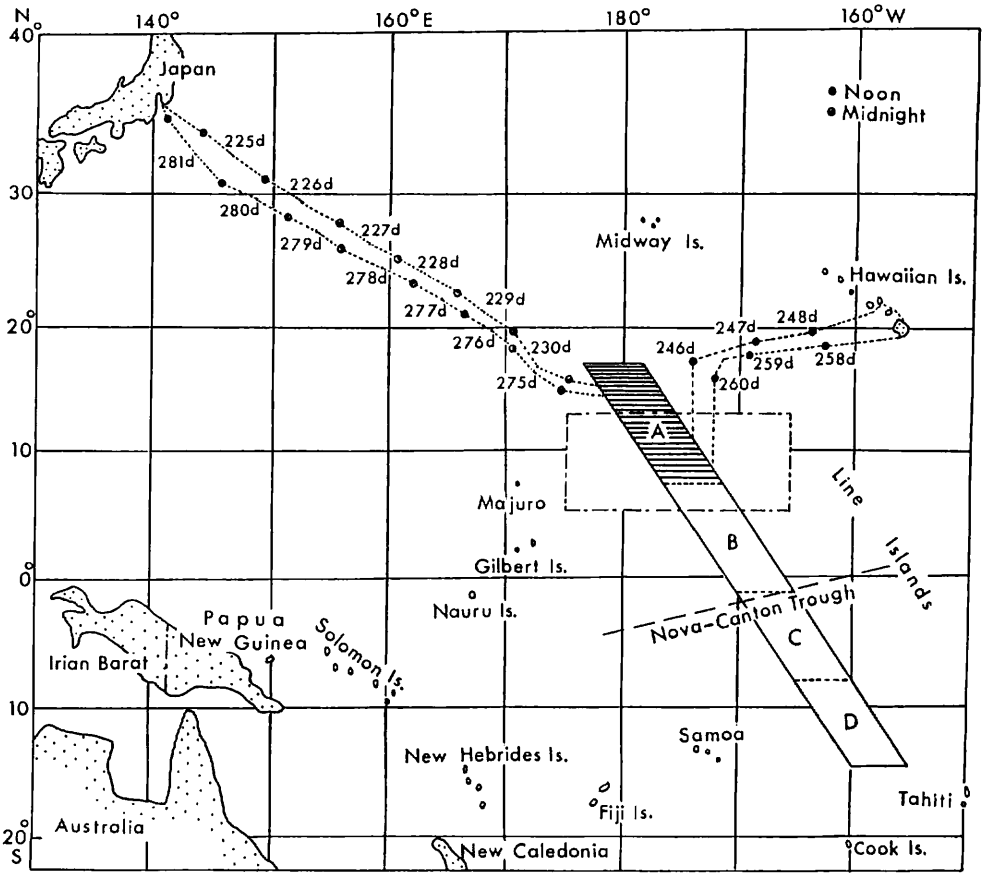


Fig. I-5 Index map of the survey areas and tracks.

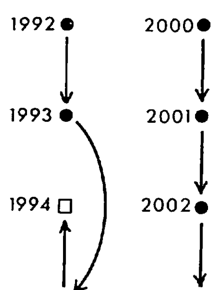


Fig. I-6 Examples of station numbers and the order of working in the serial sampling using three sets of free-fall grab (solid circle) plus one box corer or one piston corer (square).

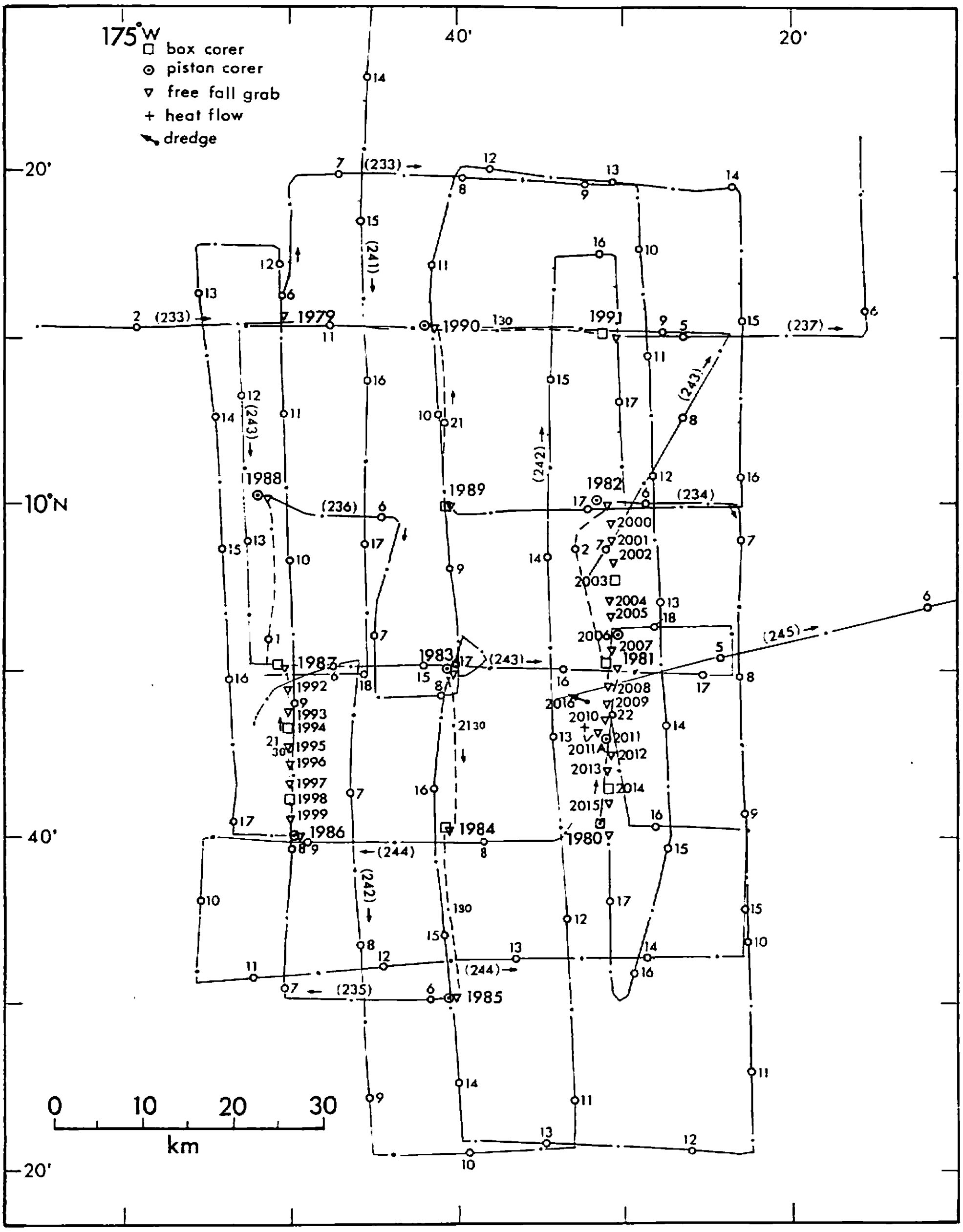


Fig. I–7 Tracks of geophysical works in the detailed survey area I.

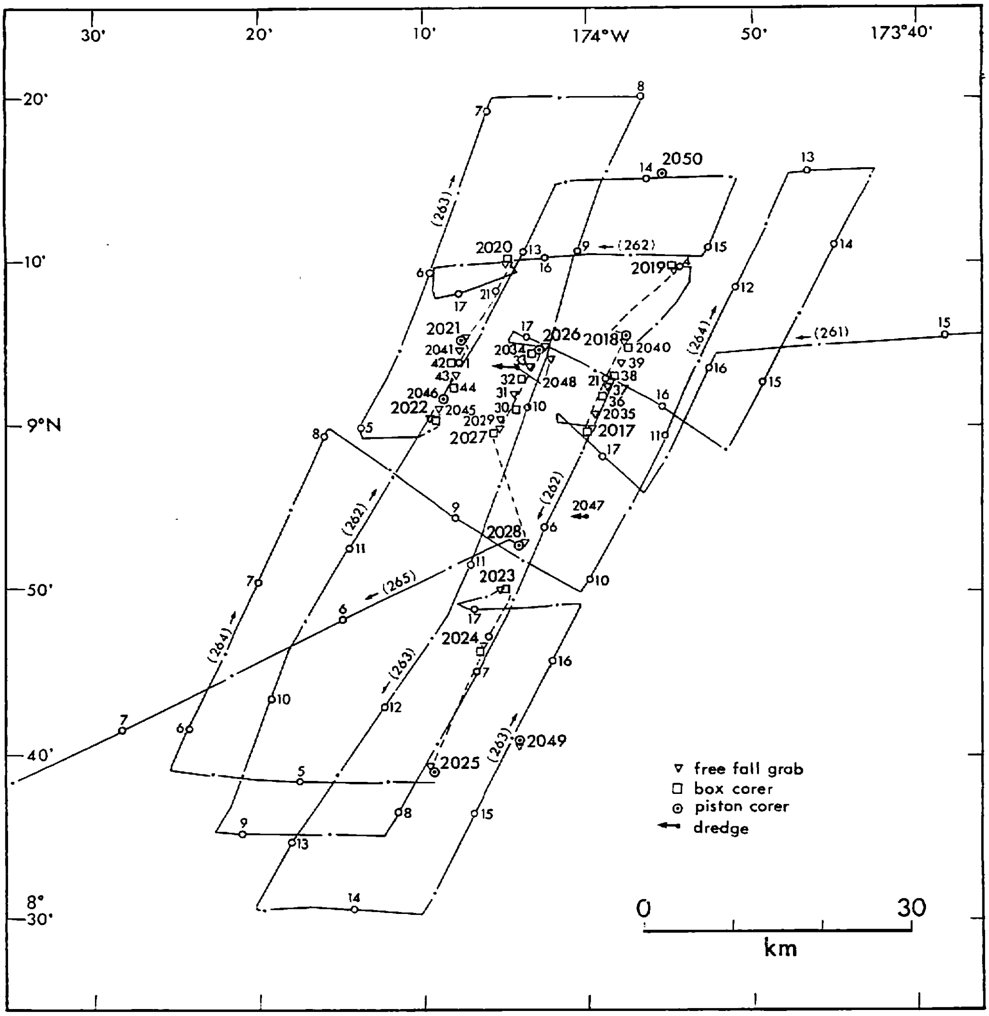


Fig. I–8 Tracks of geophysical works in the detailed survey area II.

between the survey area and Hawaii.

Arrangement of the bottom sampling was to be differed from those in the previous cruises in order to study the local variation of the nodule distribution. For each detailed survey area, 10 n.m. (detailed survey area I) or 5 n.m. (detailed survey area II) grid survey was carried out in the earlier half of the sampling, and serial sampling along some parallel lines was done in the later half.

In the grid survey, one box corer plus one set of free-fall grab or one piston cerer plus two sets of free-fall grab were used at each "station". While in the serial sampling, three sets of free-fall grab plus one box corer or one piston cerer are used as one cycle of the working along a lone, of which station numbers and the order of working are shown in Fig. I–6.

Ship's position was determined by NNSS throughout the survey area. The real time

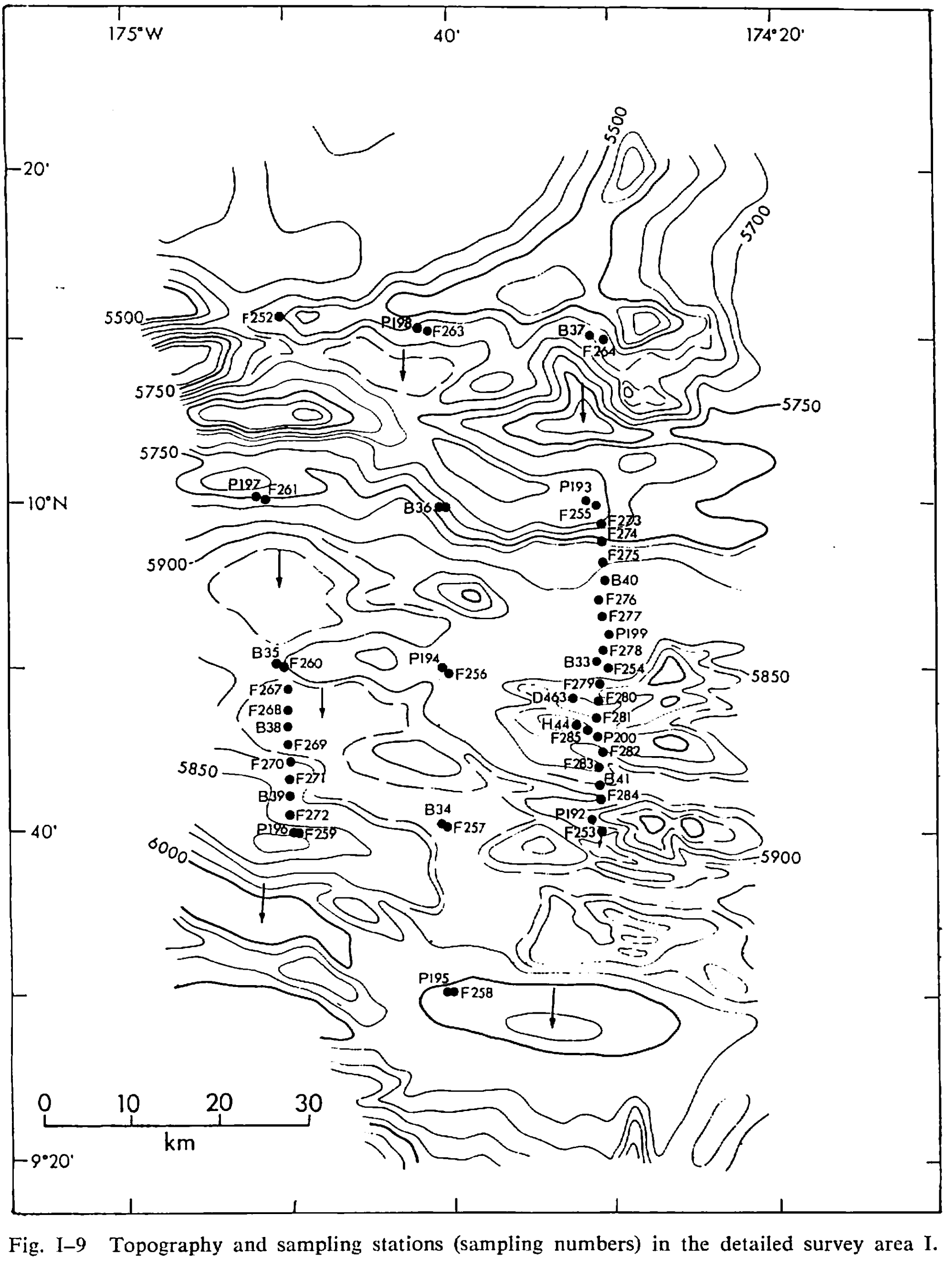


Fig. I–9 Topography and sampling stations (sampling numbers) in the detailed survey area I.

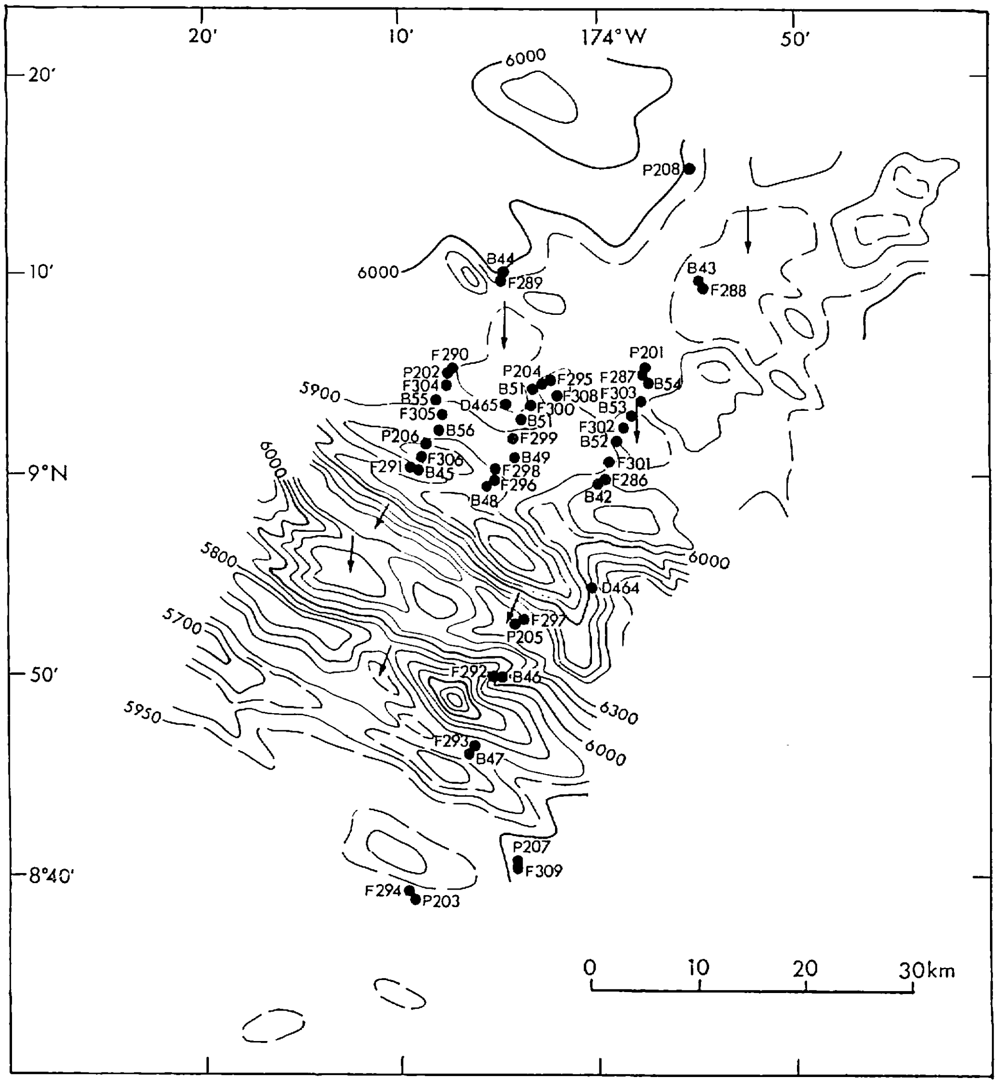


Fig. I–10 Topography and sampling stations (sampling numbers) in the detailed survey area II.

positions obtained were recalculated on the basis of estimated water current to make the accuracy as high as possible.

The samples were analyzed also in the onshore laboratory after the cruise by the GSJ and other staffs including non-on-board members. These participants in onshore laboratory works were as follows; chemical analysis of manganese nodules by T. MOCHIZUKI (GSJ): chemical analysis of bottom sediment by R. SUGISAKI (Nagoya Univ.) and N. MITA (GSJ): and clay mineral analysis of the sediments by S. AOKI (Toyo University). In addition, T. MORITANI joined the editing work of this report.

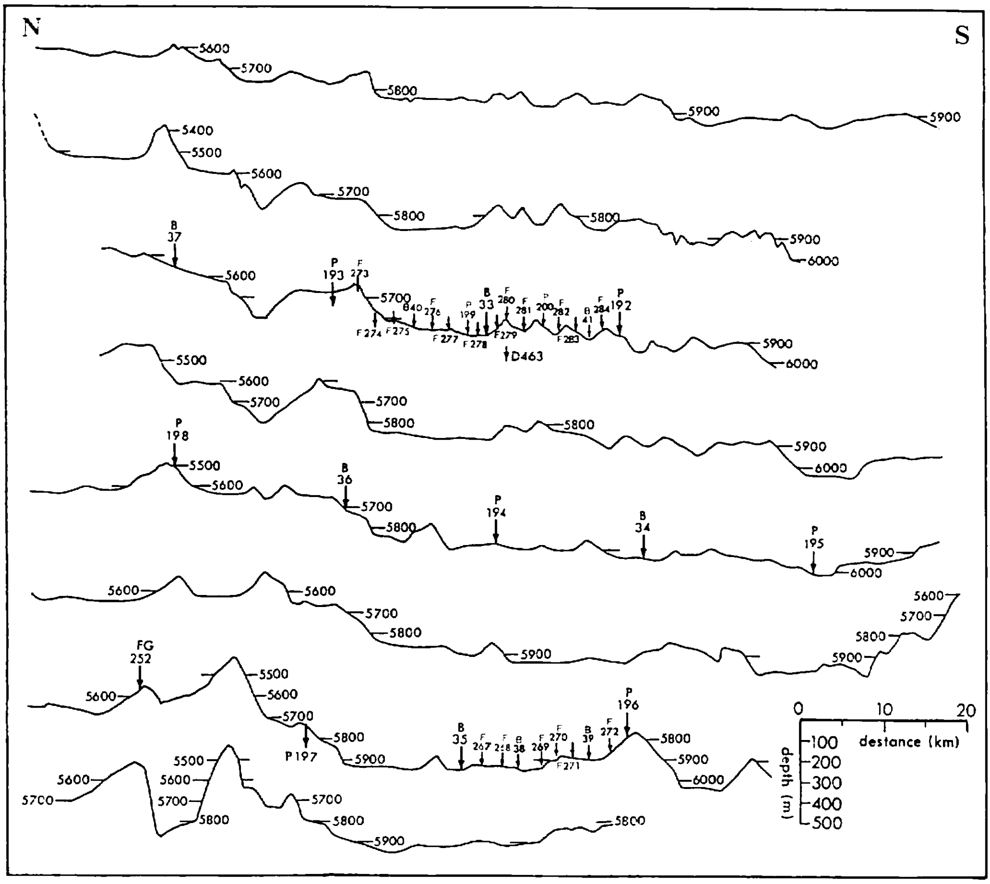


Fig. I–11 North-south topographic sections and sampling stations along them in the detailed survey area I.

Figures I–7 through I–12 show tracks of geophysical works, topography and sampling stations (sampling numbers), and major topographic sections with sampling stations along them all in the detailed survey areas. Furthermore Table I–5 shows results of on-site observation.

References

MIZUNO, A. (1981) Regional and local variabilities of manganese nodules in the Central Pacific Basin. *Geol. Surv. Japan Cruise Rept.* no. 15, p. 281–296.

MIZUNO, A. and NAKAO, S. (eds.) (1982) Regional Data of Marine Geology, Geophysics, and Manganese Nodules: The Waka-Tahiti Transect in the Central Pacific, January-March, 1980 (GH80–1 cruise). *Geol. Surv. Japan Cruise Rept.* no. 18, p. 1–399.

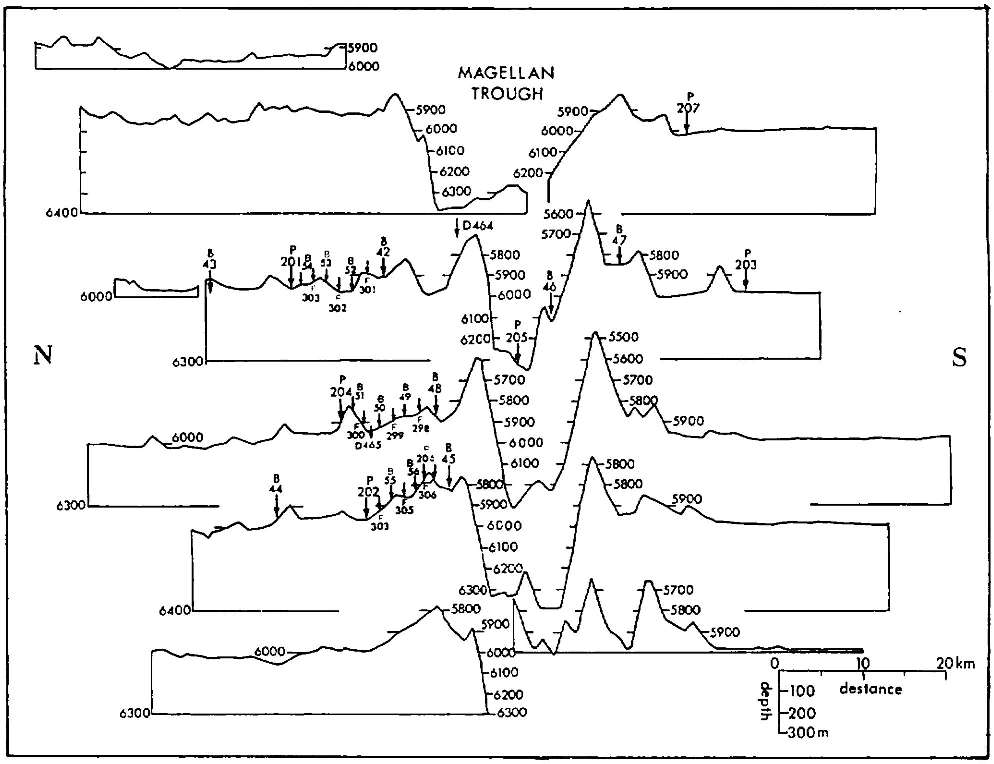


Fig. I–12 North-south topographic sections and sampling stations along them in the detailed survey area II.

Table 1-5 Results of on-site observation. (*Thickness including "turbidite" layers)

St. no.	Observ. no.	Date Julian	Date Local	Recalculated position Lat. (N)	Recalculated position Long. (W)	Corrected depth (m)	Bottom sediment	Manganese nodules Morphology etc.	Manganese nodules Abund.	Manganese nodules Cover.	Topography with the thickness of 3.5KHz transparent layer (m)
1979	FG252-1	233	19	10°10.99'	174°49.88'	5,556	sil. rich clay	ISs, IDPs	40.3kg/m²	80%	smooth top of a terrace
	" -2	"	"	10 11.04	174 49.88	5,562	"	ISs, Ds	(10.6)	80	(10m)
1980	P192	"	20	9 40.84	174 31.08	5,875	pelagic clay	-	-	-	smooth, gentle slope
	FG253	"	"	9 40.80	174 31.09	5,917	siliceous clay	IDPs, Ts+r, Ds+r	18.7	30	(15m)
1981	B33	"	"	9 50.10	174 29.89	5,869	pelagic clay	Sr, Dr	5.8	(5)	smooth, bottom of a small
	FG254	"	"	9 50.05	174 29.98	5,869	"	"	3.8	10	valley (20m)
1982	P193(H36)	234	"	10 00.13	174 31.42	5,649	siliceous clay	IDs(+r)	-	-	top of a small ridge
	FG255-1	"	"	9 59.86	174 30.93	5,649	sil. rich clay	IDPs, Ds	(16.9)	70	(20m)
	" -2	"	"	9 59.92	174 30.93	5,660	"	"	24.3	70	
1983	P194(H37)	"	21	9 49.85	174 40.40	5,896	sil. rich clay	Ds·r	-	-	gently rolled, (7-8m)
	FG256-1	"	"	9 49.57	174 39.82	5,869	"	DPs+r, ISs+r, Ds+r	21.8	50	Lack of the transparent
	" -2	"	"	9 49.61	174 40.08	5,869	"	Is+r, Ds+r, IDPs+r	19.2	40	layer is observed on the bottom of a small depth in the vicinity
1984	B34	"	"	9 40.48	174 40.75	5,952	sil. rich clay	Sr, SPr	4.7	(10)	gently rolled(20m)
	FG257	"	"	9 40.25	174 40.30	5,931	"	"	7.6	20	
1985	P195(H38)	235	"	9 30.26	174 40.08	6,025	sil. rich clay	Sr, SPr	-	-	smooth, gentle slope(10m)
	FG258-1	"	"	9 30.07	174 39.84	6,014	"	Sr, Dr	3.2	10	
	" -2	"	"	9 30.03	174 39.83	6,014	sampler unrecovered	-	-	-	
1986	P196(H39)	235	22	9 40.21	174 49.47	5,844	sil. rich clay	IDs+r	-	-	smooth, rolled slope
	FG259-1	"	"	9 40.08	174 49.39	5,844	"	IDPs+r, DPs	28.0	60	(13m)
	" -2	"	"	9 40.07	174 49.32	5,844	"	"	(10.0)	60	
1987	B35	"	"	9 50.31	174 50.99	5,952	pelagic clay	Ir, Dr, Sr, Ts+r	6.1	(15)	smooth, central depth in the
	FG260	"	"	9 50.14	174 50.29	5,952	sil. rich clay	Ir, Dr, Sr, SPr	(3.4)	-	mouth of a vast valley (13m)
1988	P197(H40)	236	"	10 00.53	174 51.81	5,796	sil. rich clay	IDPs·r	-	-	smooth, intermediate shoulder
	FG261-1	"	"	10 00.28	174 51.22	5,806	"	ISs, DPs, IDPs, Fs	26.1	70	of a slope of 500m high.
	" -2	"	"	10 00.37	174 51.25	5,796	"		23.7	70	(15m)
1989	B36	"	23	10 00.11	174 40.35	5,691	sil. rich clay	ISs, DPs, IDPs(+r), Fs	24.1	(60)	smooth, intermediate shoulder
	FG262	"	"	10 00.00	174 40.02	5,712	"	ISs, DPs, IDPs, Fs	28.9	70	of a slope of 300m high (20m)
1990	P198(H41)	"	"	10 10.86	174 41.22	5,562	sil. rich clay	IDs+r	-	-	top of a ridge (18m)
	FG263-1	"	"	10 10.50	174 41.17	5,588	"	IDs(+r), DPs, Ds	22.4	80	
	" -2	"	"	10 10.61	174 41.22	5,577	"		26.2	80	
1991	B37	237	"	10 10.10	174 30.84	5,598	siliceous clay	DPs(+r), IDPs(+r), ISs	26.2	(70)	upper shoulder of a slope
	FG264	"	"	10 10.13	174 30.52	5,567	sil. rich clay	ISs, DPs(+r), Ds(+r)	17.0	70	(10m)
1992	FG267	241	28	9 48.81	174 50.14	5,879	sil. rich clay	Sr, SPr, Dr	6.2	15	(20m) rolled, very gentle slope

Table I-5 (continued)

St. no.	Observ. no.	Date Julian	Date Local	Recalculated position Lat.(N)	Recalculated position Long.(W)	Corrected depth(m)	Bottom sediment	Manganese nodules Morphology etc.	Manganese nodules Abund.	Manganese nodules Cover.	Topography with the thickness of 3.5KHz transparent layer(m)
1993	FG268	241	28	9° 47.73'	174° 50.18'	5,912	sil. rich clay	Sr,Dr	2.2kg/m²	5 %	(40m)
1994	B38	"	"	9 46.67	174 50.44	5,952	"	Dr,Sr	1.5	(0)	(40m)
1995	FG269	"	"	9 45.54	174 50.25	5,927	pelagic clay	Sr	1.3	10	(30m)
1996	FG270	242	"	9 44.45	174 50.03	5,915	sil. rich clay	ISPs+r	9.2	30	(10m) top of a short slope
1997	FG271	"	"	9 43.33	174 50.02	5,890	"	Sr,SPr,Dr	6.6	20	(25m) rolled terrace
1998	B39	"	"	9 42.29	174 50.16	5,910	"	SPs·r+r,Ds r+r	7.6	(20)	(18m)
1999	FG272	"	"	9 41.08	174 50.02	5,890	"	SPs(+r),ISs+r,IDs+r	15.9	30	(15m)
2000	FG273	"	29	9 58.94	174 30.80	5,634	no sample	ISs(+r),Ds,DPs(+r)	13.3	70	(20m) top of a ridge
2001	FG274	"	"	9 57.88	174 30.75	5,744	sil. rich clay	DPs,ISPs,ISs	24.5	60	(15m) slope
2002	FG275	"	"	9 56.81	174 30.69	5,806	"	IDs(+r),DPs(+r),ISs	26.2	60	(30m)
2003	B40	"	"	9 55.51	174 30.68	5,848	"	ISPs+r,IDPs+r	25.1	(50)	(38m) bottom of a vast valley
2004	FG276	243	"	9 54.26	174 30.87	5,848	sil. rich clay	SPs(+r),DPs(+r), ISPs(+r)	21.4	50	(10m)
2005	FG277	"	"	9 53.04	174 30.82	5,848	"	SPs·r+r,Sr,Ds·r+r	8.0	(40)	(10m)
2006	P199(H42)	"	"	9 51.98	174 30.55	5,869	"	Sr	-	-	(20m)
2007	FG278	"	"	9 50.67	174 30.74	5,879	"	Sr,Dr	4.4	10	(15m)
2008	FG279	"	30	9 48.94	174 31.08	5,796	sil. rich clay	Dr,Sr	(0.9)	20	(20m) rolled bottom of a
2009	FG280	"	"	9 47.97	174 31.13	5,827	no sample	Sr	(0.9)	15	(28m) valley
2010	FG281	"	"	9 46.98	174 31.19	5,848	sil. rich clay	Sr,Dr,SPr	6.4	20	(20m)
2011	P200(H43)	"	"	9 46.20	174 31.50	5,858	"	-	-	-	(30m)
2012	FG282	244	"	9 44.78	174 31.01	5,869	no sample	Sr	(0.2)	10	(15m)
2013	FG283	"	"	9 43.63	174 31.01	5,848	zeol. rich clay	Sr,Dr,SPr	3.5	10	(30m)
2014	B41	"	"	9 42.06	174 31.16	5,867	sil. rich clay	Dr s+r,Sr,IDPr s+r	11.3	(30)	(15m)
2015	FG284	"	"	9 41.39	174 31.03	5,838	no sample	IDPs(+s·r),ISs(+s·r)	11.5	25	(15m)
2016	D463	"	31	9 47.93	174 31.62	5,838	-	Dr,Sr	-	-	(20-35m)rooled bottom of a valley
2011A	H44	245	"	9 46.46	174 32.41	5,827	sil. rich clay	Sr	-	-	(no data) rolled bottom of
	FG285	"	"	9 46.30	174 31.76	5,806	no sample	Ds·r+r,DPs·r+r	2.7	30	(30m) a valley
2017	B42(c)	261	17	8 59.81	173 59.87	5,890	sil. rich clay	Ds+r,ISs+r,DPs+r, IDPs+r	23.6	(50)	(25m) S rolled, north of the Magellan trough.
	FG286	"	"	8 59.97	173 59.68	5,900	"	ISs+r,IDs+r	26,5	50	(")
2018	P201(H45)	"	"	9 05.47	173 57.52	5,942	"	-	-	-	(30m)
	FG287-1	"	"	9 05.24	173 57.73	5,942	"	Dr,Ir,Sr	1.3	-	(")
	" -2	"	"	9 05.30	173 57.70	5,942	"	ISr,Ir,Sr	1.0	0	(")
2019	B43(c)	262	"	9 09.87	173 54.84	5,977	"	Dr,Sr	1.7	0	(30m)
	FG288	"	"	9 09.82	173 54.66	5,979	"	-	0	0	(") N
2020	B44(c)	"	18	9 10.18	174 04.92	5,983	"	IDPr,Dr,ISr	18.6	25	(10m) N "
	FG289	"	"	9 09.94	174 04.94	5,962	no sample	Dr,IDPr,SEr	7.4	25	(0m)
2021	P202(H46)	"	"	9 05.15	174 07.47	5,983	siliceous clay	Sr	-	-	(15m)
	FG290-1	"	"	9 05.03	174 07.44	5,983	sil. rich clay	Sr,Dr	(0.7)	0	(10m)

Table 1-5 (continued)

St. no.	Observ. no.	Date: Julian	Date: Local	Recalculated position: Lat. (N)	Recalculated position: Long. (W)	Corrected depth (m)	Bottom sediment	Manganese nodules: Morphology etc.	Manganese nodules: Abund.	Manganese nodules: Cover.	Topography with the thickness of 3.5KHz transparent layer (m)
2021	FG290-2	262	18	9°04.96'	174°07.44'	5,975	sil. rich clay	Dr,Sr	2.8kg/m^2	0%	(10m)
2022	B45(c)	263	"	9 00.44	174 09.44	5,814	"	IDs+s·r,Is+s·r,IDs	24.4	50	(20m)
	FG291	"	"	9 00.33	174 09.67	5,820	"	IDPs+s·r,ISs+s·r,Fs	20.5	50	(") S
2023	B46(c)	"	19	8 50.13	174 04.97	6,201	"	-	0	(30)	(0m) southern, steep slope
	FG292	"	"	8 50.05	174 05.09	6,211	"	IDPr,ISr	4.3	2	(") of the Magellan trough
2024	B47(c)	"	"	8 46.44	174 06.51	5,869	"	IDPr	8.7	25	(10m) flat, southern margin
	FG293	"	"	8 46.58	174 06.30	5,864	"	IDPr	11.5	15	(15m) of the Magellan trough
2025	P203(H47)	264	"	8 39.02	174 09.65	5,984	pelagic clay	-	-	-	(80m) flat, south of the
	FG294-1	"	"	8 39.14	174 09.71	5,982	sil. rich clay	-	0	0	(") Magellan trough
	" -2	"	"	8 39.10	174 09.70	5,982	"	Dr,Ir	0.1	-	(")
2026	P204(H48)	"	20	9 04.93	174 02.60	5,936	"	SPr	-	-	(20m) N rolled, north of the
	FG295-1	"	"	9 04.90	174 02.42	5,910	no sample	IDPr,Dr,ISPr,Sr	11.3	25	(") Magellan trough
	" -2	"	"	9 04.99	174 02.42	5,926	sil. rich clay	ISPr,IDPr,Dr	13.9	20	(")
2027	B48(c)	"	"	8 59.69	174 05.61	5,777	"	IDs, ISs,IDPs,IDs+r	10.6	60	(40m)
	FG296	"	"	8 59.81	174 05.34	5,780	(siliceous sponge spicules)	Fr,crust	(1.7)	(30)	(") S
2028	P205(H49)	265	"	8 52.84	174 03.98	6,338	sil. rich clay	ISs,ISs+s·r	-	-	(20m) bottom of the Magellan
	FG297-1	"	"	8 53.04	174 03.73	6,325	"	ISs,IDs	9.2	50	(12m) trough
	" -2	"	"	8 52.96	174 03.71	6,328	"	IDs,IDPs,DPs,Fs	23.6	60	(")
2029	FG298	267	23	9 00.37	174 05.16	5,806	"	IDs+s·r,ISs+s·r, IDPs+s·r	19.9	50	(20m) S rolled, north of the Magellan trough
2030	B49(c)	"	"	9 01.09	174 04.49	5,853	"	IDs+r,ISs+r,IDPs+r	20.2	40	(30m)
2031	FG299	"	"	9 01.93	174 04.37	5,860	"	ISs+s r,IDs+s r,IDs	28.6	50	(25m)
2032	B50(c)	"	"	9 02.85	174 04.00	5,926	"	ISr,ISPr,IDr	33.6	30	(18m)
2033	FG300	268	"	9 03.45	174 03.53	5,954	"	Sr,SEr,ISr	24.0	25	(20m)
2034	B51(c)	"	"	9 04.43	174 03.23	5,952	"	IDr,IDPr	18.1	20	(20m) N
2035	FG301	"	24	9 00.73	173 59.54	5,893	"	ISs+s·r,IDs+s·r, Fs+s·r	21.1	40	(40m) S rolled, north of the Magellan trough
2036	B52(c)	"	"	9 01.92	173 58.92	5,980	"	Sr,ISr	27.3	20	(15m)
2037	FG302	"	"	9 02.19	173 58.76	5,994	"	Sr	(0.6)	0	(10m)
2038	B53(c)	"	"	9 03.03	173 58.07	5,931	"	Sr,Dr	0.8	(0)	(20m)
2039	FG303	269	"	9 03.88	173 58.10	5,921	"	Sr,Ir	2.1	0	(30m)
2040	B54(c)	"	"	9 04.71	173 57.70	5,952	"	Sr,Ir	0.3	0	(30m) N
2041	FG304	"	25	9 04.53	174 07.85	5,947	no sample	Sr,SPr	5.4	-	(10m) N rolled, north of the
2042	B55(c)	"	"	9 03.87	174 08.30	5,879	sil. rich clay	Sr,SPr,Dr	9.7	30	(10m) Magellan trough
2043	FG305	"	"	9 03.02	174 08.23	5,858	no sample	Dr,IDr	3.2	30	(12m)
2044	B56(c)	"	"	9 02.31	174 08.39	5,841	sil. rich clay	IDs+r,IDPs+r,DPs+r, Ds+r	14.8	40	(10m)
2045	FG306	270	"	9 01.09	174 09.19	5,775	"	IDs(+s·r),DPs(+s·r), ISs+s·r	23.1	60	(15m) S

Table I-5 (continued)

St. no.	Observ. no	Date		Recalculated position		Corrected	Bottom	Manganese nodules			Topography with the thickness
		Julian	Local	Lat.(N)	Long.(W)	depth(m)	sediment	Morphology etc.	Abund.	Cover.	of 3.5KHz transparent layer(m)
2046	P206(H50)	270	25	9°01.65'	174°08.89'	5,744	sil. rich clay	IDPs+s·r	- kg/m^2	- %	(15m)
	FG307	"	"	9 01.73	174 08.89	5,791	"	ISs+s·r, IDs(+s·r), IDPs+s·r	20.0	40	(")
2047	D464	"	26	8 54.60	174 00.18	6,103	basalt fragment as a core of Mn-nodule:	Ds·r+r, IDs·r+r, Ds+r, IDs+r	-	-	(0m) northern slope of the Magellan trough
2048	D465	271	"	9 03.42	174 04.06	5,968	no sample	ISr, SEr, ISPr	-	-	(20m) rolled, north of the Magellan trough
	FG308	"	"	9 04.01	174 02.22	5,890	"	ISr, SEr, ISPr	(8.1)	30	(")
2049	P207(H51)	"	27	8 41.24	174 04.25	6,014	sil. rich clay	Dr	-	-	(60m)* flat, south of the
	FG309	"	"	8 41.03	174 04.33	6,014	"	Sr	trace	0	(") Magellan trough
2050	P208	272	"	9 15.54	173 55.74	5,985	"	-	-	-	(0m) rolled, north of the Magellan trough