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IX. CHEMICAL COMPOSITION OF DEEP-SEA SEDIMENTS IN THE SOUTHERN PART OF THE CENTRAL PACIFIC BASIN (GH82-4 AREA)

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Introduction

Characteristics of areal and vertical distributions of concentrations of the elements in the sediments are described in the southern part of the Central Pacific Basin. The concentrations of major elements (SiO_2, TiO_2, Al_2O_3, Fe_2O_3, FeO, MgO, CaO, K_2O, MnO, P_2O_5, and H_2O+) and minor elements (Co, Ni, Cu, Zn, and Pb) were determined for 104 sediment samples.

Sampling method and sample locations

Deep-sea sediments were sampled in the vicinity of the Nova-Canton Trough during the GH82-4 cruise by box corers and piston corers (Fig. IX-1). Surface sediments were collected by box corers at thirteen stations (B72 to B84). Sub-samples, 2 to 3 cm from surface, were taken for chemical analysis. Long sediment cores, up to 8 meters, were collected at five stations (P336, P341, P352, P353, P355). Sub-samples were

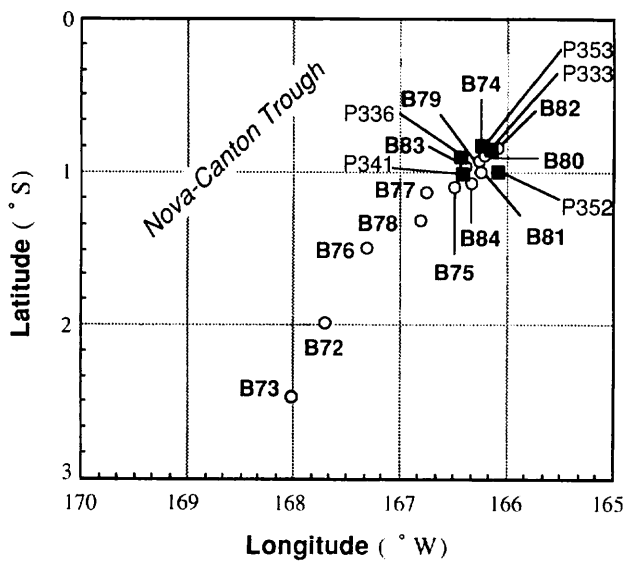

Fig. IX-1 Sample locations. Circle: surface sediments collected by box corer. Box: sediment corers.

Keywords: surface sediment, sediment core, atomic absorption, metal element, submarine weathering, Central Pacific Basin, Hakurei-Maru, Nova-Canton Trough

Table IX-1 Concentrations of elements of bottom sediments in the GH82-4 area (in 110°C dried basis).

No.	Sample Name	SiO_2 (%)	TiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	FeO (%)	MnO (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	P_2O_5 (%)	CO_2 (%)	H_2O+ (%)	SO_3 (%)	CaF_2 (%)	Total (%)
1	B72	61.90	0.93	11.92	6.81	0.83	0.91	2.46	1.94	1.10	1.43	0.48		9.25			99.96
2	B73	58.88	1.04	12.71	7.40	0.83	1.26	2.97	2.68	1.23	1.57	0.67	0.06	8.67			99.97
3	B74	56.66	0.63	10.72	5.53	0.40	0.75	2.24	7.20	0.97	1.42	0.48	3.57	9.38			99.95
4	B74 4-6	57.96	0.60	10.10	5.38	0.29	0.73	2.07	7.47	0.87	1.35	0.45	3.82	8.87			99.96
5	B74 9-11	27.52	0.38	5.71	3.15	0.34	0.44	1.24	31.50	0.58	0.85	0.24	23.24	4.78			99.97
6	B74 16-18	29.46	0.45	6.60	3.56	0.08	0.45	1.46	29.36	0.69	0.98	0.23	22.05	4.60			99.97
7	B74 23-25	27.98	0.42	6.19	3.71	0.05	0.47	1.36	30.66	0.63	0.92	0.21	22.66	4.72			99.98
8	B74 35-37	25.64	0.53	5.14	3.09	0.37	0.12	1.25	33.42	0.56	0.81	0.19	25.03	3.81			99.96
9	B75	54.18	0.62	10.63	6.04	0.10	0.77	2.30	9.05	1.01	1.44	0.49	4.94	8.39			99.96
10	B75 4-6	50.60	0.59	9.95	5.56	0.10	0.73	2.06	12.42	0.89	1.33	0.48	7.64	7.62			99.97
11	B75 9-11	33.02	0.44	6.24	4.09	0.06	0.48	1.50	26.95	0.70	0.98	0.29	19.59	5.61			99.95
12	B75 14-16	28.02	0.43	7.12	3.76	0.03	0.54	1.41	30.19	0.67	0.90	0.28	22.46	4.15			99.96
13	B75 20-22	27.98	0.42	6.28	3.79	0.00	0.54	1.35	30.44	0.64	0.90	0.29	22.84	4.51			99.98
14	B75 31-33	50.66	0.75	11.05	6.71	0.00	0.98	2.46	10.28	1.07	1.59	0.59	5.91	7.89			99.94
15	B76	63.70	0.87	11.76	6.61	0.67	0.89	2.33	1.74	1.05	1.40	0.42		8.53			99.97
16	B77	61.90	0.77	11.98	6.27	0.60	0.85	2.29	2.63	0.96	1.49	0.46	0.21	9.54			99.95
17	B77 4-6	61.46	0.74	11.96	6.39	0.44	0.83	2.40	3.29	1.00	1.58	0.46	0.32	9.07			99.94
18	B77 9-11	57.12	0.69	11.09	6.20	0.13	0.78	2.16	7.21	0.92	1.47	0.41	3.35	8.42			99.95
19	B77 18-20	34.28	0.55	7.73	4.76	0.12	0.48	1.69	24.85	0.81	1.12	0.27	17.88	5.42			99.96
20	B77 28-30	23.90	0.36	5.10	3.06	0.07	0.33	1.15	34.24	0.54	0.77	0.57	25.80	4.06			99.95
21	B78	58.44	0.70	10.95	6.25	0.19	0.86	2.33	5.98	0.94	1.44	0.70	2.06	9.12			99.96
22	B78 5-7	55.97	0.66	10.47	5.87	0.14	0.81	2.17	8.08	0.97	1.43	0.69	3.70	9.01			99.97
23	B78 9-11	38.76	0.50	7.69	4.37	0.04	0.56	1.62	22.45	0.76	1.08	0.48	15.64	5.99			99.94
24	B78 15-17	40.92	0.54	7.92	4.59	0.03	0.63	1.68	20.62	0.78	1.07	0.58	14.15	6.45			99.96
25	B78 28-30	74.58	0.27	6.74	3.05	0.05	0.79	1.87	1.32	0.55	0.65	0.36		9.74			99.97
26	B79	61.42	0.73	11.60	6.31	0.34	0.80	2.40	3.32	1.01	1.58	0.47	0.32	9.66			99.96
27	B80	62.52	0.76	11.93	6.40	0.48	0.89	2.57	1.99	1.04	1.63	0.49		9.27			99.97
28	B80 4-6	62.70	0.81	12.39	6.68	0.61	0.92	2.46	1.78	1.01	1.63	0.40		8.58			99.97
29	B80 9-11	59.12	0.88	12.91	7.67	0.23	1.05	2.68	3.45	1.12	1.81	0.40	0.29	8.35			99.96
30	B80 15-17	59.84	0.90	13.12	7.78	0.27	1.07	2.77	2.62	1.12	1.87	0.37	0.14	8.08			99.95
31	B80 22-24	60.56	0.94	13.34	8.31	0.20	1.12	2.76	1.59	1.07	1.76	0.24		8.08			99.97
32	B80 30-32	60.92	0.92	13.20	8.23	0.02	1.09	2.77	1.69	1.05	1.78	0.25		8.05			99.97
33	B81	61.60	0.71	11.72	6.71	0.00	0.85	2.41	3.83	0.97	1.59	0.49	0.53	8.57			99.98
34	B82	60.78	0.70	11.73	6.75	0.00	0.87	2.58	4.07	1.09	1.63	0.49	0.91	8.38			99.98
35	B83	60.28	0.75	11.65	7.17	0.00	1.93	2.65	2.86	1.11	1.62	0.54	0.17	9.11			99.84
36	B84	59.80	0.70	11.32	6.08	0.41	0.84	2.21	4.70	0.93	1.47	0.51	1.59	9.41			99.97
37	P336	55.42	0.81	12.22	10.51	0.00	3.41	2.58	1.95	0.80	1.45	0.78		9.73			99.66
38	P336 19-24	54.44	1.04	14.83	12.22	0.00	0.36	3.64	0.50	0.54	4.38	0.11		7.88			99.94
39	P336 45-50	11.94	0.23	2.61	4.27	0.02	1.20	0.95	36.09	0.60	0.65	26.24	3.19	3.83	0.77	7.27	99.86
40	P336 CC	56.06	1.27	15.86	9.92	0.00	0.54	4.15	0.68	1.22	2.38	0.12		7.75			99.95
41	P341(1)70-75	36.26	0.53	7.98	4.77	0.05	0.63	1.58	23.76	0.73	1.13	0.31	16.72	5.52			99.97
42	P341(2)20-25	60.34	0.91	13.23	8.18	0.00	0.93	2.83	1.76	1.11	1.81	0.32		8.53			99.95
43	P341(2)70-75	60.82	0.87	13.17	7.95	0.00	1.09	2.62	1.64	0.99	1.67	0.28		8.86			99.96
44	P341(3)20-25	59.66	0.86	13.71	8.11	0.00	1.11	2.70	1.80	1.04	1.71	0.42		8.85			99.97
45	P341(3)70-75	60.62	0.89	12.61	8.12	0.00	1.30	2.66	1.87	0.99	1.57	0.40		8.90			99.93
46	P341(4)20-25	69.84	0.63	8.36	5.26	0.00	1.13	1.76	1.79	0.76	0.98	0.51		8.93			99.95
47	P341(4)70-75	72.46	0.50	7.68	4.25	0.00	1.02	1.43	1.58	0.68	0.97	0.43		8.97			99.97
48	P341(5)20-25	71.18	0.47	7.52	4.29	0.00	1.31	1.39	2.14	0.74	1.02	0.80	0.09	9.00			99.95
49	P341(5)70-75	71.46	0.51	7.95	4.26	0.00	0.94	1.48	1.59	0.69	1.10	0.40		9.58			99.96
50	P341(6)20-25	73.58	0.47	7.58	3.94	0.00	0.86	1.30	1.35	0.65	1.06	0.30		8.87			99.96
51	P341(6)70-75	71.46	0.50	8.32	4.19	0.00	0.97	1.51	1.72	0.70	1.18	0.44		8.98			99.97
52	P341(7)20-25	74.10	0.39	7.24	3.60	0.00	0.86	1.23	1.35	0.63	1.07	0.38		9.13			99.98
53	P341(7)70-75	73.26	0.43	7.51	4.09	0.00	1.09	1.36	1.43	0.59	0.93	0.39		8.88			99.96
54	P341(8)20-25	74.60	0.35	7.12	3.69	0.00	1.00	1.26	1.18	0.55	0.85	0.30		9.06			99.96
55	P341(8)70-75	73.80	0.35	7.36	3.81	0.00	1.05	1.38	1.36	0.63	0.95	0.37		8.92			99.98

Table IX-1 (continued)

No.	Sample Name	SiO_2 (%)	TiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)	FeO (%)	MnO (%)	MgO (%)	CaO (%)	Na_2O (%)	K_2O (%)	P_2O_5 (%)	CO_2 (%)	H_2O+ (%)	SO_3 (%)	CaF_2 (%)	Total (%)
56	P341 CC	72.32	0.35	7.34	3.90	0.00	1.08	1.53	1.89	0.70	1.01	0.65		9.22			99.99
57	P352(1)70-75	59.94	0.97	13.30	8.27	0.23	0.84	2.80	1.73	1.13	1.80	0.26		8.68			99.95
58	P352(2)20-25	60.40	0.88	13.40	8.50	0.00	1.10	2.72	1.50	1.04	1.68	0.21		8.54			99.97
59	P352(2)70-75	59.84	0.92	13.55	8.71	0.00	1.08	2.82	1.50	1.10	1.70	0.21		8.53			99.96
60	P352(3)20-25	60.00	0.87	12.94	8.29	0.00	1.21	2.78	1.57	1.01	1.64	0.27		9.37			99.95
61	P352(3)70-75	60.98	0.83	13.16	7.81	0.00	1.26	2.58	1.45	1.08	1.73	0.24		8.84			99.96
62	P352(4)20-25	61.18	0.90	12.62	8.29	0.00	1.15	2.60	1.62	1.05	1.60	0.27		8.70			99.98
63	P352(4)70-75	60.90	0.89	12.75	8.35	0.00	1.05	2.71	1.69	1.06	1.59	0.33		8.65			99.97
64	P352(5)20-25	58.42	1.05	13.54	8.99	0.00	1.41	3.07	1.83	1.04	1.46	0.30		8.84			99.95
65	P352(5)70-75	57.50	1.12	13.45	9.23	0.00	1.40	3.30	2.04	1.10	1.54	0.35	0.07	8.86			99.96
66	P352(6)20-25	59.70	1.06	12.90	8.63	0.00	1.26	2.86	1.71	1.03	1.44	0.27		9.09			99.95
67	P352(6)70-75	60.82	0.98	12.66	8.10	0.00	1.22	2.71	1.83	1.12	1.52	0.24		8.77			99.97
68	P352(7)20-25	64.62	0.85	11.64	7.01	0.00	1.07	2.27	1.44	0.97	1.43	0.16		8.52			99.98
69	P352(7)70-75	63.10	0.98	11.54	7.61	0.00	0.78	2.45	1.72	1.09	1.48	0.20		9.00			99.95
70	P352(8)20-25	62.18	0.95	11.68	7.40	0.00	1.30	2.50	2.00	1.27	1.58	0.32	0.05	8.73			99.96
71	P352(8)70-75	62.94	0.96	11.81	7.24	0.00	0.91	2.51	2.01	1.29	1.59	0.28	0.04	8.40			99.98
72	P352 CC	63.94	0.97	11.69	7.11	0.37	0.57	2.41	1.72	1.08	1.42	0.18		8.51			99.97
73	P353(1)70-75	55.69	0.85	9.85	7.63	0.00	0.85	2.81	5.74	1.19	1.76	0.30	3.35	9.94			99.96
74	P353(2)20-25	60.36	0.82	12.28	7.94	0.00	1.17	2.77	1.71	1.05	1.69	0.34		9.82			99.95
75	P353(2)70-75	45.84	0.60	9.41	6.05	0.00	0.69	2.34	14.59	1.02	1.47	0.36	9.97	7.61			99.95
76	P353(3)20-25	58.04	0.84	12.79	7.60	0.11	0.83	2.80	1.74	1.12	1.74	3.75		8.60			99.96
77	P353(3)70-75	57.88	0.85	12.48	7.85	0.00	1.10	2.76	1.68	1.08	1.72	3.70		8.85			99.95
78	P353(4)20-25	58.62	0.93	12.65	8.14	0.00	1.14	2.75	1.79	1.01	1.57	3.33		8.01			99.94
79	P353(4)70-75	59.54	1.05	12.89	7.91	0.00	1.25	2.97	2.22	1.12	1.79	0.31	0.08	8.82			99.95
80	P353(5)20-25	62.24	0.92	12.82	7.55	0.00	0.62	2.76	1.51	1.04	1.67	0.19		8.63			99.95
81	P353(5)70-75	62.22	0.98	11.87	7.99	0.00	1.15	2.70	1.63	0.99	1.55	0.25		8.63			99.96
82	P353(6)20-25	67.76	0.68	8.82	5.79	0.00	1.06	2.64	1.97	1.10	1.58	0.32		8.25			99.97
83	P353(6)70-75	72.45	0.49	6.64	5.68	0.00	0.81	1.84	1.62	0.80	1.12	0.34		8.16			99.95
84	P353(7)20-25	57.51	0.46	15.26	8.98	0.00	1.06	2.70	1.67	0.99	1.52	0.34		9.46			99.95
85	P353(7)70-75	56.41	0.48	14.25	8.94	0.00	1.36	3.15	2.05	1.14	1.69	0.39	0.19	9.81			99.86
86	P353(8)20-25	56.64	0.47	14.52	8.81	0.00	1.30	2.98	2.02	1.10	1.67	0.34	0.21	9.79			99.85
87	P353(8)70-75	51.94	0.44	13.31	5.85	0.00	1.92	2.30	7.52	0.74	2.38	3.77	0.41	9.29			99.87
88	P353 CC	52.85	0.44	13.53	5.46	0.00	1.98	2.32	7.15	0.74	2.45	3.39	0.35	9.24			99.90
89	P355(1)70-75	58.34	0.85	13.78	8.21	0.00	1.22	2.99	2.29	1.09	1.83	0.30	0.17	8.88			99.95
90	P355(2)20-25	62.66	0.77	12.63	6.41	0.66	0.36	2.74	1.53	1.01	1.70	0.19		9.29			99.95
91	P355(2)70-75	61.14	0.83	12.35	7.95	0.00	1.12	2.71	1.62	0.98	1.59	0.25		9.41			99.95
92	P355(3)20-25	60.66	0.87	12.63	8.28	0.00	0.83	2.92	1.79	1.05	1.63	0.31		9.01			99.98
93	P355(3)70-75	58.80	0.94	13.07	8.68	0.00	1.36	3.01	1.94	1.08	1.70	0.34		9.04			99.96
94	P355(4)20-25	60.86	0.92	12.62	8.25	0.00	1.03	2.73	1.73	0.98	1.56	0.30		8.97			99.95
95	P355(4)70-75	59.26	0.97	12.52	8.56	0.00	1.19	2.87	1.91	1.05	1.58	0.37		9.67			99.95
96	P355(5)20-25	61.00	0.93	11.95	8.00	0.00	1.13	2.71	1.80	1.00	1.52	0.33		9.58			99.95
97	P355(5)70-75	63.58	0.87	10.70	8.24	0.00	1.07	2.53	1.62	0.97	1.45	0.22		8.72			99.97
98	P355(6)20-25	62.98	0.93	10.82	7.46	0.00	0.94	2.62	1.89	1.08	1.58	0.29		9.38			99.97
99	P355(6)70-75	62.80	0.94	11.59	7.34	0.00	0.99	2.59	1.99	1.13	1.52	0.29		8.77			99.95
100	P355(7)20-25	62.70	0.93	11.39	7.23	0.00	1.09	2.64	2.17	1.11	1.53	0.38	0.09	8.71			99.97
101	P355(7)70-75	64.04	0.93	10.38	6.92	0.00	1.16	2.40	2.22	1.04	1.37	0.39	0.10	9.01			99.96
102	P355(8)20-25	67.62	0.74	9.29	6.11	0.00	0.75	2.02	1.93	0.94	1.25	0.40		8.92			99.97
103	P355(8)70-75	72.26	0.57	7.49	4.86	0.00	0.74	1.65	1.41	0.77	1.02	0.28		8.91			99.96
104	P355 CC	73.54	0.55	7.27	4.64	0.00	0.65	1.65	1.29	0.75	0.94	0.23		8.45			99.96

Table IX-2 Concentrations of elements of bottom sediments in the GH82-4 area (in 110°C dried basis).

No.	Depth below sea bottom (cm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	Pb (ppm)	No.	Depth below sea bottom (cm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	Pb (ppm)
1	1	68	107	237	75	26	56	769	101	181	171	59	12
2	1	66	109	226	76	13	57	33	84	109	281	94	19
3	1	58	107	240	75	21	58	83	97	122	293	84	18
4	5	55	96	211	69	24	59	133	94	111	296	90	21
5	10	47	87	157	71	45	60	183	92	213	344	91	18
6	17	52	82	150	83	49	61	233	86	175	303	94	28
7	24	46	75	132	69	43	62	283	87	148	309	95	19
8	36	30	44	103	66	43	63	333	96	118	287	92	22
9	1	64	124	219	72	26	64	383	114	224	383	111	31
10	5	63	120	212	81	13	65	433	111	240	337	109	22
11	10	54	101	157	81	40	66	483	106	151	327	96	13
12	15	55	116	159	78	44	67	533	91	175	333	85	6
13	21	56	119	172	79	44	68	583	76	138	291	78	13
14	32	93	176	244	90	13	69	633	79	94	278	84	19
15	1	63	103	246	72	20	70	683	87	205	348	85	20
16	1	63	125	249	68	13	71	733	102	110	283	88	18
17	5	63	125	258	83	15	72	762	59	99	269	97	17
18	10	68	125	232	79	16	73	48	84	112	274	103	30
19	19	62	86	168	92	56	74	98	81	191	326	97	17
20	29	44	65	130	72	47	75	148	54	109	218	97	31
21	1	74	134	256	76	21	76	198	84	132	288	92	16
22	6	67	129	232	82	18	77	248	100	168	337	96	22
23	10	59	110	197	88	59	78	298	111	219	387	100	21
24	16	64	119	196	92	41	79	348	105	200	362	109	19
25	29	66	149	218	65	4	80	398	87	205	353	96	28
26	1	63	115	246	87	21	81	448	99	228	342	95	25
27	1	62	118	261	81	15	82	498	78	185	273	78	11
28	5	75	135	287	93	18	83	548	76	203	270	78	19
29	10	85	151	291	97	32	84	598	147	356	639	240	18
30	16	85	138	281	91	47	85	648	150	368	621	245	31
31	23	83	133	305	93	32	86	698	172	421	796	329	30
32	31	79	146	305	93	35	87	748	121	356	532	224	19
33	1	62	112	242	68	12	88	785	128	337	455	217	18
34	1	63	123	256	78	20	89	38	90	203	336	113	27
35	1	358	3377	2592	296	47	90	88	55	77	233	96	26
36	1	65	119	243	84	26	91	138	87	163	316	91	19
37	1	214	1153	946	175	78	92	188	76	129	316	119	24
38	3	73	404	339	191	24	93	238	102	199	374	107	29
39	12	41	511	331	149	75	94	288	101	170	352	113	26
40	37	40	184	333	391	27	95	338	112	228	387	110	26
41	96	52	100	175	84	65	96	388	93	179	355	106	28
42	32	83	123	281	104	39	97	438	76	162	334	113	21
43	82	90	171	309	101	29	98	488	86	130	311	95	18
44	132	96	176	305	99	28	99	538	77	143	319	92	19
45	182	112	228	321	101	22	100	588	86	193	337	95	20
46	257	103	236	290	86	17	101	638	96	200	337	100	22
47	332	91	161	228	74	12	102	688	72	115	252	77	12
48	382	135	246	246	72	25	103	738	56	156	238	75	12
49	432	84	111	195	58	29	104	767	57	114	209	60	7
50	482	78	94	166	52	20							
51	532	91	118	205	54	6							
52	582	74	97	156	35	4							
53	632	110	147	204	60	19							
54	682	93	151	186	46	9							
55	730	90	175	174	46	7							

taken for analysis at 5 cm intervals.

Preparation and analytical method

To determine the heavy metallic minor elements (Co, Ni, Cu, Zn, and Pb), air-dried sediments were decomposed by hydrofluoric acid, nitric acid, perchloric acid without rinsing. The solutions were evaporated to dryness and finally adjusted to 0.3 N hydrochloric acid. These elements were determined by atomic absorption spectrometry. Analytical values were converted into 110°C dried basis from their moisture contents after drying in oven.

To determine the major elements (SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, and H_2O+), wet sediments were rinsed by distilled water until sea-salt was removed. Then the rinsed sample was dried at 110°C for 3 hours. The analytical value were presented on 110°C dried basis. The concentration of SiO_2 was determined by gravimeric and spectrophotometric method, P_2O_5, TiO_2 and FeO by spectrophotometric method, Al_2O_3 by volumetric method, MgO, CaO, Na_2O, K_2O, MnO and total Fe by atomic absorption spectrometry, and H_2O+ by gravimetry. The concentration of Fe_2O_3 was calculated by subtracting FeO from total Fe.

Results and discussions

Analytical values of SiO_2, TiO_2, Al_2O_3, FeO, MgO, CaO, Na_2O, MnO, P_2O_5, H_2O+ in surface sediments are shown in Table IX-1. Those of Co, Ni, Cu, Zn, and Pb in sediments are shown in Table IX-2 together with depths below sea bed. Sedimentary facies is described by Nishimura and Ikehara (chapter VI, this volume).

Characteristics of areal distribution

The areal distribution of Al/Ti ratio, Fe, Mn, Fe/Mn ratio, Cu, Ni, and Cu/Ni ratio in thirteen surface sediments (B72 to B84) are shown in Fig. IX-2.

Lisitzin (1978) described that the representative values of Al/Ti for volcanic rocks are 32 for granite, 22 for andesite, and 11 for oceanic basalt. The ratios are compared with the values by Mita and Nakao (1990). The Al/Ti ratios in surface sediments of this area are approximately 15 for the Stations B74 and B75. Although these two values are the highest in this area, they are almost the same values as in the Mid-Pacific Mountains which are roughly lower than average value of 20 in the Central Pacific Basin. The values (6.22, 7.29, and 8.22 in B76, B72, and B73, respectively) are significantly low like in the sediments of the Penrhyn Basin which also show lower values than oceanic basalt. Thus three surface sediments are likely to be derived from weathered oceanic basalt. The values, 10.7 to 12.7, of other eight samples are almost the same as in oceanic basalt.

The concentration of Mn (3.5% at B83) is much higher than the common value of 0.5% for other stations of this area. This value is even higher than 2.2% in surface sediment at the Penrhyn Basin (Mita and Nakao, 1990). The concentrations of Cu and Ni show same trend as Mn concentration.

Characteristics of vertical distribution

The vertical distribution of major and minor elements in cores (P341 and P352)

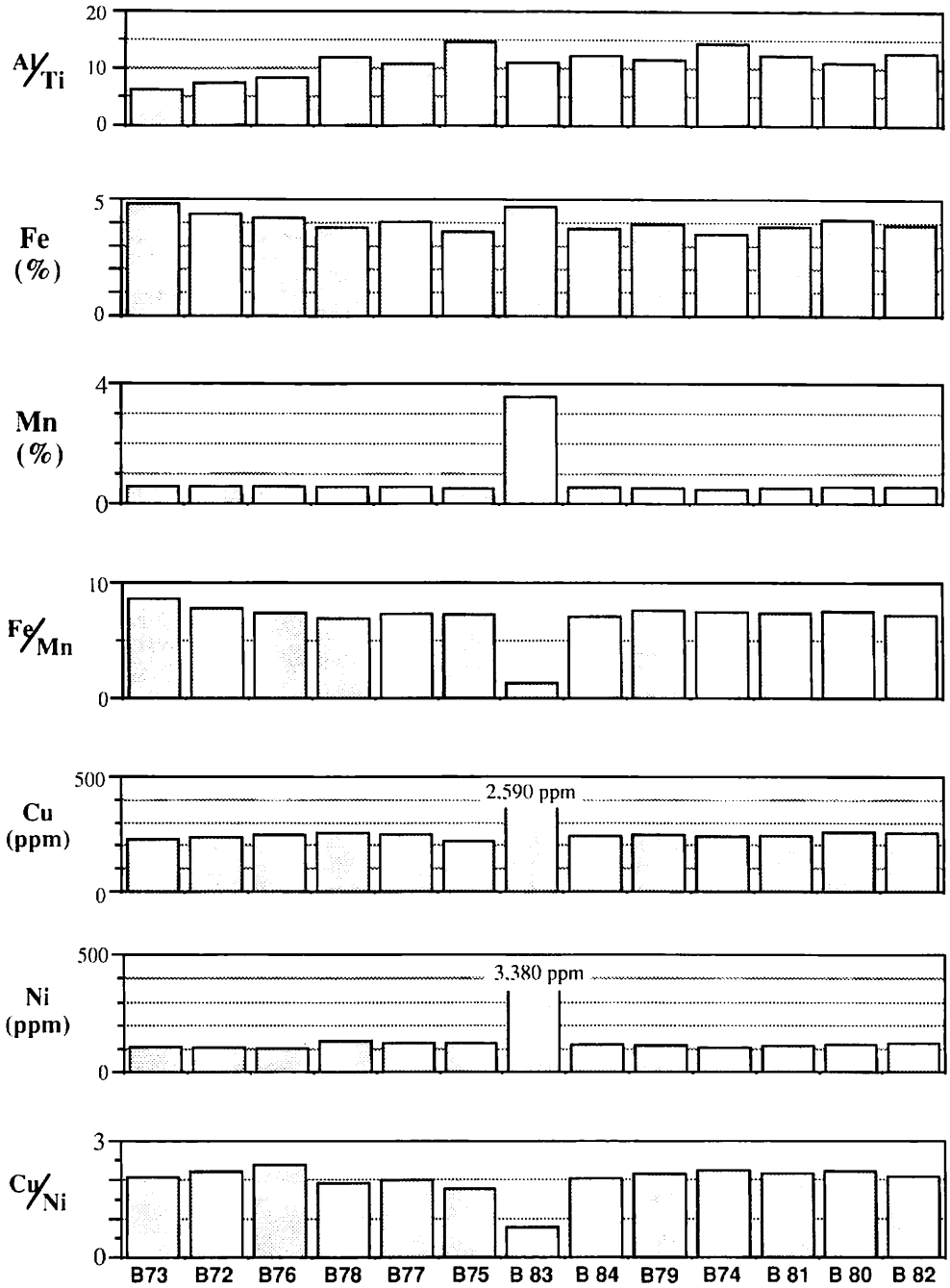

Fig. IX-2 Areal distribution of Al/Ti, Fe, Mn, Fe/Mn, Cu, Ni, and Cu/Ni in the surface sediments collected by box corer.

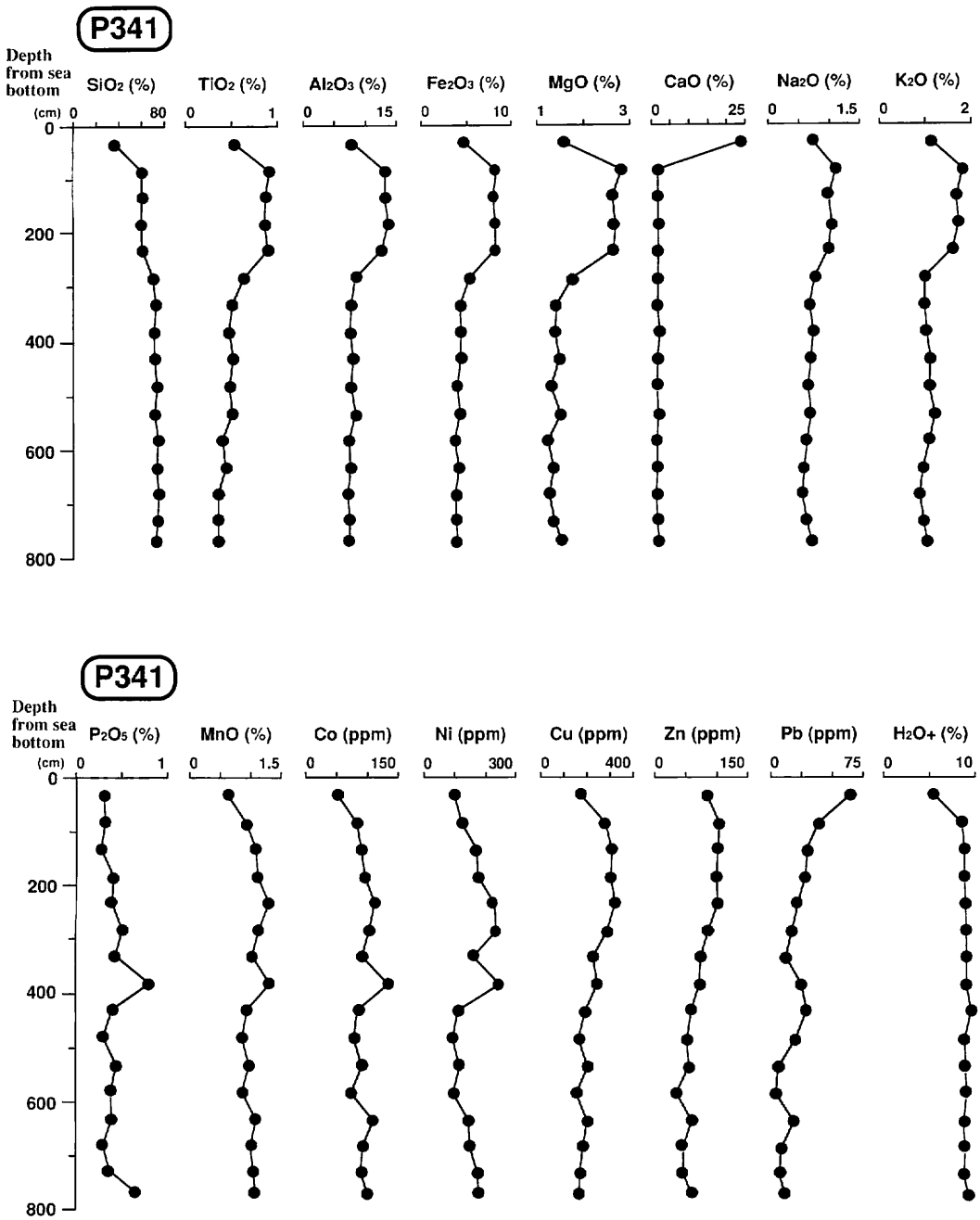

Fig. IX-3 Vertical distribution of concentration of major and minor components in the core, P341.

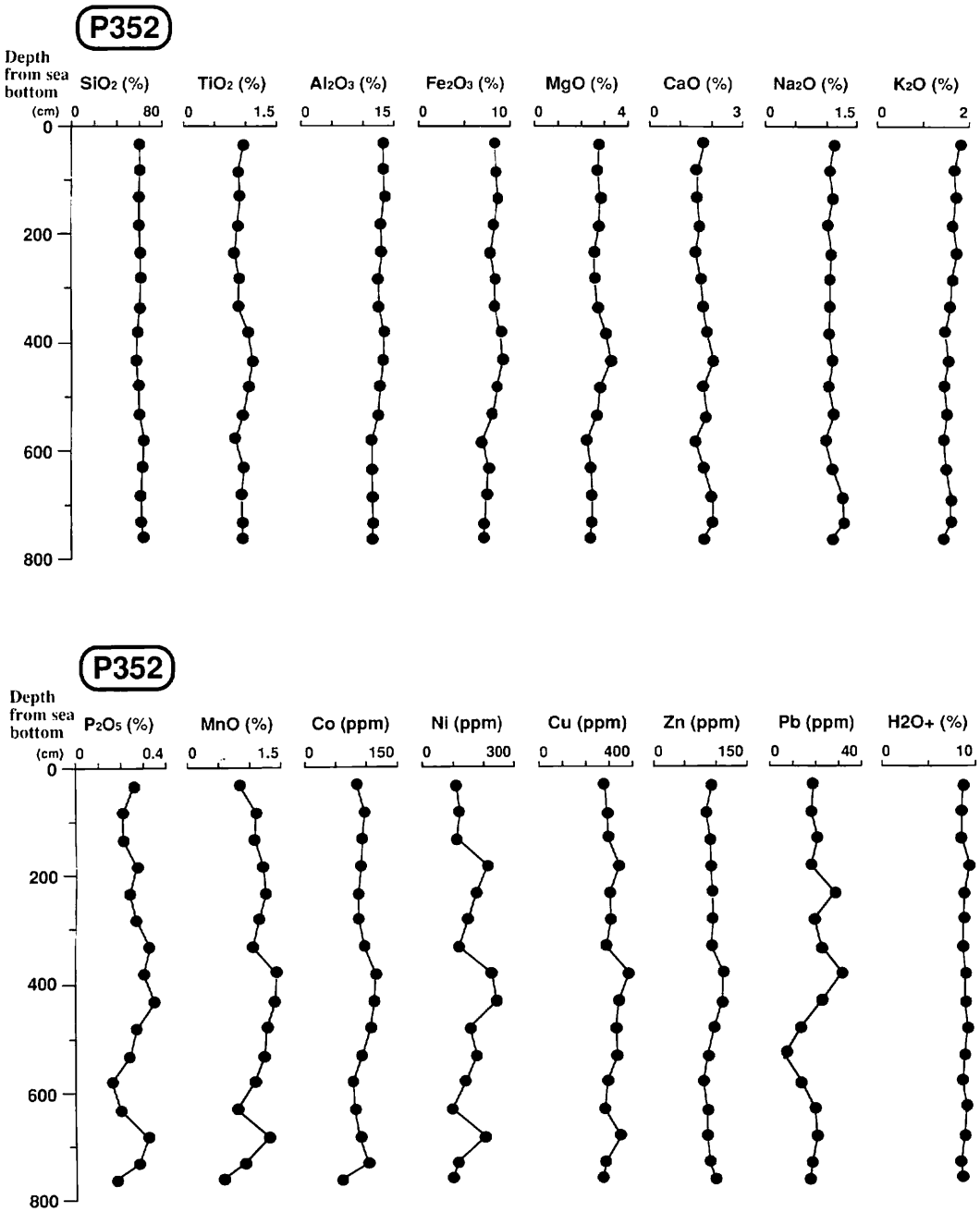

Fig. IX-4 Vertical distribution of concentration of major and minor components in the core, P352.

are shown Fig. IX-3 and Fig. IX-4.

Station P341

The concentration of SiO_2 is depleted to 36.26% in minimum at 32 cm depth below the sea bottom in this station. The lowest H_2O+ and extremely high concentration of CaO (23.76%) and CO_2 (16.72%) at the same depth may reflect abundant calcareous fossils. The concentration of SiO_2 is about 60% between 82 and 232 cm depths, and 71.2 to 74.5% between 282 and 769 cm depths. The sediments below 232 cm depth may contain more siliceous fossils than in the upper part, because the concentration of six components (TiO_2, Al_2O_3, Fe_2O_3, MgO, Na_2O, and K_2O) at 82 to 232 cm depth are also higher.

Distribution patterns of P_2O_5, MnO, Co, and Ni show similar trends to each other which have maximum concentrations at 382 cm depth. Although the trends of Cu and Zn are similar to above four components, they do not have maximum. Distribution of Pb is almost similar to the four components, but its concentration increases toward the sea floor. A gap of sedimentary facies may exist in this horizon, because these components show abnormally high concentrations at 382 cm depth.

Station P352

In contrast to the Station P341, there are no significant variation patterns of concentration for nine major components (SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, and H_2O+). Despite this flat pattern for the above elements, the greater vertical variations are found for seven minor components, P_2O_5, MnO, Co, Ni, Cu, Zn, and Pb, which are mutually correlated. Slightly higher concentrations of TiO_2, Fe_2O_3, MgO, and CaO are found at 382 to 482 cm depth.

References

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