UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Chemistry of pelagic sediment and associated ferromanganese nodules: DOMES Site A, Equatorial North Pacific

By

D. Piper [1.]

P. Rude [1.]

Open-File Report 85-353

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

[1.] USGS, Menlo Park, CA. 94025

1985

Introduction

This report presents the results of chemical analyses of pelagic sediment samples and associated ferromanganese nodules collected at DOMES Site A (figs. 1 and 2), located in the equatorial North Pacific. Analyses of samples, which were collected at four additional locations at DOMES Site A on earlier cruises, have been presented by Bischoff and others (1979) and Piper and others (1979).

The samples examined in this study were taken from 7.5 cm diameter sub-cores of 66 box cores. The box cores were collected on two cruises of the R/V Oceanographer, cruises RP-23-OC77 and RP-1-OC78. Core locations (table 1) were determined by a bottom transponder net to better than $\pm$ 250 m. (fig. 2).

Cores containing two types of sediment lithology were recovered (Piper and Blueford, 1982), cores containing only Quaternary sediment and those containing early Tertiary sediment overlain by 0.5 to 20 cm of Quaternary sediment (table 2, fig. 3). The two sediments of different age can be distinguished by their radiolarian assemblage, color, and mineralogy (Piper and Blueford, 1982). The Tertiary sediment was recovered along the southern portion of an east-west trending depression (figs. 2 and 4). The Quaternary sediments were recovered from throughout the area, but cores containing only Quaternary sediment were recovered from the highlands and along the northern portion of the depression.

The sea floor coverage of nodules (fig. 5) tended to be lower in cores which contained Tertiary sediment than in those containing only Quaternary sediment. The reader should consult Piper and Blueford (1982) for a complete discussion of the physical properties of the sediments and nodules.

The purpose of this report is to present the results of chemical analyses for these samples. These data will support a series of papers describing the geology of this site. The papers which discuss these samples include the following: Piper and Blueford, 1982; Calvert and Piper, 1984a; Calvert and Piper 1984b; Calvert and others, 1983; Piper and Rude, 1983; Piper and others, 1985; and Piper, 1985.

Analytical Procedures

The sediment samples were dried at 60°C for 12-16 hrs prior to grinding and analysis. Samples from box core DJ 66 (table 3) were also first washed of sea salt with deionized water. The difference between the Na_2O values of these sediment samples and the remaining unwashed samples gives a total sea salt content for the unwashed samples of approximately 2.5 percent by weight.

A second aliquot of the ground samples was treated with hydroxylamine hydrochloride-acetic acid (HH-AA). This leaching technique, developed by Chester and Hughes (1967), has been interpreted to remove from the bulk of the sediment finely dispersed metal oxides, which often represent the major part of the hydrogenous fraction (Goldberg, 1963) of the sediment. HH-AA also dissolves $CaCO_3$. The amount of $CaCO_3$ in the sediment can be estimated by the amount of soluble Ca present after correcting for the silicate contribution, mostly clays. Approximately 0.75 to 1.3 percent Ca was leached by HH-AA from sediment samples found by petrographic analyses of smear-slides to be free of $CaCO_3$. Slightly more Ca was leached from the Tertiary than for the Quaternary sediment. Thus, $CaCO_3$ is present in those cores for which the soluble Ca is significantly greater than 1.3 percent, i.e. the CaO contribution from silicates. These include only the cores from less than 5000 m depth.

The bulk sediment and sediment residues were analyzed (table 3) for their major oxides by x-ray fluorescence (XRF) by the method of Elsheimer and Fabbi (unpublished manuscript). Average precision is less than 2.5 percent; accuracy is also considered better than 2.5 percent. This precision and accuracy is supported by the sum of oxides and loss on ignition (LOI) determined for 15 samples (table 3). These samples give sums of 98.5 ± 0.6 percent. The minor elements, mostly Ba and lesser amounts of Co, Cu, Ni, and Zn make up the remaining 1 to 2 percent. Thus, the sums approach 100 percent very closely.

Minor elements in these same samples (tables 4 and 5) were measured (Baedecker, 1979) by neutron activation analysis (NAA). Precision of this technique is better than 10 percent. The analyses of Fe by NAA and XRF (table 6) allow an independent estimate of accuracy. These two analyses agree to within ±5 percent for 80 percent of the samples analyzed, indicating an accuracy for Fe of the NAA analyses that exceeds the reported precision.

The composition of the fraction of sediment soluble in HH-AA (table 7) was determined in the leachate by atomic absorption spectrophotometry (AAS). Average precision for AAS is better than 7 percent (Dymond, 1981). The accuracy is again estimated by the agreement of elemental concentrations in the HH-AA leachate (table 7) and their concentrations in the insoluble residues (table 3) with their concentrations in the bulk sediment (table 3). Consider the CaO values for core DJ 15. For the depth interval (10-12 cm), the respective values are 0.73 percent plus 0.62 percent versus 1.32 percent. The concentration of CaO in the insoluble residue has been adjusted, reduced by 10 percent, owing to loss of weight upon leaching. This average weight loss on leaching has been ascertained from the increase in concentration of SiO_2 and Cr between unleached and leached sediment because they were not extracted in the fraction soluble in HH-AA. These elements show insignificant dissolution in HH-AA. Other samples, in addition to DJ 15 (10-12 cm), show a similar excellent agreement, even though the error for the sum is the cumulative error of the three analyses.

Other elements which appear to be insoluble in HH-AA and which might be used to estimate the loss of weight on leaching include Cs, Hf, Rb, and possibly Ba.

Nodules were analyzed by AAS (table 8), after washing in deionized water, drying at 60°C, grinding, and leaching with HH-AA. Precision for this analysis is also better than 7 percent. Elements were also analyzed in the bulk nodules by NAA (table 9). Comparison of Co and Zn, measured by both procedures (table 6), gives excellent agreement in the range of ± 5 percent. This precision is similar to the accuracy obtained by analyzing the nodule standard P-1 (Flanagan and Gottfried, 1980, table 22). Iron, however, presents a severe problem. The AAS values are as much as 40 percent higher than the NAA measurements. Our determination of Fe in P-1 by AAS, also was higher than the recommended value (Flanagan and Gottfried, 1980) by approximately 10 percent. However, a second standard (A-1) was also analyzed and all determinations, including Fe, agreed closely with the suggested "best" values recommended by Flanagan and Gottfried. The reason for the discrepancy in Fe values for the DJ nodules and the P-1 standard is not known. We must assume that the AAS values are too high.

Nodule mineralogy was measured by X-ray diffraction. See Piper and Blueford (1983) for a description of this procedure. Total carbon (table 10) was measured gasometrically by a LECO* carbon analyzer. These samples had been analyzed by emission spectroscopy (data not presented here), XRF, or AAS and found to contain negligible CaO in excess of that associated with the silicate fraction of sediment. Also, they are all from greater than 5000 m depth (table 1). Five samples were also analyzed before and following leaching with 0.1NHCl. No change in total carbon was observed. Thus, $CaCO_3$ was assumed to be absent. The carbon values in table 10 therefore represent organic carbon.

Conclusion

The accuracy and precision of the analytical techniques used in this study have

* The use of brand-names is strictly for descriptive purposes.

been well established by the analysis of standard samples and replicate analyses of individual samples. In this study we measured several elements in individual samples, by the different techniques: XRF, NAA, and AAS. The excellent agreement achieved between the different analyses reflect the high precision of the individual techniques. The one exception is the determination of Fe in ferromanganese nodules by AAS. We have no explanation for the high Fe values which this procedure measured.

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Table 1. Location and depth of each box core and the type and number of samples analyzed, on the sediment and nodules.

Core	Location lat-lon (deg.-min.)	Depth (m)	SEDIMENT XRF[1]	AA[2]	NAA[3]	OC[4]	Nodules AA	NAA
DJ01	09 23.6 N 151 32.8 W	5157		10			1	
DJ02	09 23.5 N 151 32.9 W	5155	4	13			2	1
DJ03	09 22.8 N 151 31.8 W	5164					1	1
DJ06	09 22.9 N 151 31.6 W	5172					1	
DJ07	09 22.9 N 151 32.0 W	5170					1	
DJ08	09 25.2 N 151 34.5 W	5205					1	1
DJ09	09 23.1 N 151 31.7 W	5176					1	1
DJ10	09 22.8 N 151 31.8 W	5183					5	1
DJ11	09 23.5 N 151 22.5 W	5174	3	9		11	4	
DJ12	09 22.9 N 151 20.6 W	5187	3	9	1		2	1
DJ13	09 23.3 N 151 23.0 W	5187				11	2	
DJ14	09 18.0 N 151 25.6 W	5231					1	1
DJ15	09 20.3 N 151 24.1 W	5166	7	14	14		1	1
DJ16	09 18.6 N 151 28.5 W	5120	4				1	
DJ17	09 21.1 N 151 32.9 W	5166					2	
DJ18	09 25.6 N 151 31.2 W	5160	7	10	7		1	
DJ19	09 19.5 N 151 32.2 W	5117					1	
DJ20	09 19.8 N 151 35.1 W	5260					1	1
DJ21	09 20.5 N 151 45.0 W	5203		13			1	
DJ22	09 32.4 N 151 39.1 W	4908					1	
DJ23	09 33.2 N 151 38.3 W	4934	4	10			1	1
DJ24	09 39.2 N 151 17 1 W	5164		10			1	1
DJ25	09 22.6 N 151 12.3 W	5177	4	10				
DJ26	09 24.8 N 151 16.4 W	5170					2	
DJ27	09 24.0 N 151 17.6 W	5267					4	4
DJ28	09 24.1 N 151 17.7 W	5197		12			2	1
DJ29	09 23.4 N 151 15.6 W	5183	2	11			4	
DJ30	09 25.3 N 151 10.0 W	5175					1	1
DJ32	09 16.0 N 151 56.1 W	5043					1	
DJ34	09 16.7 N 151 09.8 W	4842	3	12			2	1
DJ35	09 19.3 N 151 28.9 W	5130	6	12	13	11	1	
DJ36	09 26.7 N 151 32.8 W	5231		13			1	1
DJ37	09 25.5 N 151 38.3 W	5197					1	
DJ38	09 36.3 N 151 58.0 W	5086		13				
DJ39	09 35.8 N 151 06.8 W	5117		13			4	1
DJ40	09 23.5 N 151 29.2 W	5221					3	
DJ41	09 22.7 N 151 28.0 W	5194					3	
DJ42	09 23.6 N 151 28.0 W	5282					1	
DJ44	09 24.5 N 151 27.5 W	5233					1	
DJ46	09 22.8 N 151 27.6 W	5216					1	
DJ47	09 21.0 N 151 28.7 W	5208					1	
DJ48	09 22.0 N 151 25.9 W	5165					1	
DJ49	09 23.4 N 151 25.3 W	5171					4	
DJ50	09 22.1 N 151 24.5 W	5086					1	
DJ52	09 20.9 N 151 24.8 W	5093					1	
DJ53	09 20.4 N 151 24.7 W	5074				10		
DJ56	09 20.9 N 151 30.9 W	5159					1	
DJ59	09 17.6 N 151 33.3 W	5011		14			1	
DJ63	09 24.8 N 151 30.2 W	5215					1	
DJ64	09 25.6 N 151 32.1	5178				11		
DJ65	09 26.4 N 151 32.2 W	5258					1	
DJ66	09 27.0 N 151 35.9 W	5250	6	15	8		1	
DJ69	09 15.8 N 151 30.7 W	5049					1	
DJ70	09 16.7 N 151 28.7 W	4942					1	
DJ72	09 33.8 N 151 21.3 W	5240					1	
DJ73	09 28.1 N 151 15.6 W	5107					1	

1 X-ray fluoresence.
2 Atomic absorption spectroscopy.
3 Neutron activation analysis.
4 Organic carbon analysis.

Table 2. Physical properties of sediment and nodules at DOMES Site A.

Core No.	Location[1]	Nodule Data					Core Length (cm)	Sediment Data		
		Mineral[2]	Diameter (cm) Ave/Max	Texture[3]	Abundance (kg/m^2)	Cover (%)		Quaternary[4] Thick (cm)	Quaternary[4] Units[5]	Tertiary[4] Thick. (cm)
DJ - 1	valley	32/65	3.8/7.1	G	6.5	10	33	2	1	31
DJ - 2	valley	32/65	2.5/7.4	G	4.8	10	42	14	1	28
DJ - 3	valley	35/65	4.2/7.6	G	8.7	10	47	47	1,2,3,4	0
DJ - 4[6]	valley			--encrusted chert--						
DJ - 6	valley		4.5/9.6	G	4.1	5	37	37	1,4	0
DJ - 7[6]	valley			G						
DJ - 8	valley	30/63	3.4/8.9	G	1.1	3	37	37	1,3	0
DJ - 9[6]	valley	35/62		G						
DJ - 10	valley	42/67	3.8/5.3	G		1	37	37	1,2,3	0
DJ - 11	valley	44/70	3.8/5.1	G		15	29	2	1	27
DJ - 12	valley	40/60	3.1/4.3	G	0.2	1	27	<0.5	1	27
DJ - 13	valley		2.9/5.0	G	9.5	17	37	2	1	35
DJ - 14	valley	6/58	3.8/4.4	S	9.9	15	45	45	1,2,3	0
DJ - 15	highlands	10/55	2.3/5.7	S	8.4	25	42	42	1,2,3	0
DJ - 16	valley		3.0/7.1	G	8.9	20	41	41	1,2,3	0
DJ - 17[6]	valley			G						
DJ - 18	valley	54/65	3.0/5.6	G	8.1	12	40	40	1,3	0
DJ - 19[6]	valley			G						
DJ - 20	valley	32/56	4.1/9.0	G	8.2	12	36	36	1,3	0
DJ - 21		25/68	2.4/5.4	S	6.2	11	42	42	1,2,3	0
DJ - 22	highlands	12/64	2.9/5.1	S	10.4	20	28	28	1,3	0
DJ - 23	highlands	13/50	2.3/7.1	S	19.4	60	42	42	1,2,3	0
DJ - 24	highlands	8/63	1.8/5.1	S	10.1	25	40	40	1,4	0
DJ - 25	valley	50/68	3.1/5.7	G	4.9	8	41	10	1,2	30
DJ - 26	valley	68/80	2.7/4.9	G	0.2	1	19	<0.5	1	19
DJ - 27	valley	35/70		G	7.5	12	35	20	1,3	15
DJ - 28	valley	32/62		G	3.4	5	38	8	1	30
DJ - 29	valley	47/67	2.3/4.5	G	1.4	1	32	6	1	26
DJ - 30	valley	38/72	3.6/6.1	G	1.0	3	27	<0.5	1	27
DJ - 31	valley		2.2/6.2	G		4	24	<0.5	1	24
DJ - 32			2.6/6.2	S	11.5	25	33	33	1,2	0
DJ - 34	highlands	5/58	1.5/3.8	S	13.8	35	37	37	1,2	0
DJ - 35	valley		5.3/8.1	G		7	34	5	1	29
DJ - 36	valley	38/63	3.4/6.1	G	14.0	18	42	42	1,2,3	0
DJ - 37	valley	36/60	3.1/7.0	G		17	31	2	1	29
DJ - 38					0	0	43	43	1,2,3,4	0
DJ - 39	highlands	35/60	2.8/5.0	S	12.0	45	35	35	1,2,4	0
DJ - 40	valley	76/76	4.1/6.0	G	8.7	10	39	39	1,2,3	0
DJ - 41	valley		3.7/5.3	G	3.7	5	36	23	1,2	13
DJ - 42	valley		4.3/8.9	G		2	40	10	1	30
DJ - 43	valley		3.0/6.1	G		12	42	42	1,3	0
DJ - 44	valley		3.3/5.3	G	7.8	14	40	40	1,3	0
DJ - 45	valley		3.4/5.2	G		2	41	41	1,3,4	0
DJ - 46	valley		4.2/6.2	G		5	42	42	1,3,4	0
DJ - 47	valley		5.1/7.0	G		8	36	36	1,3,4	0
DJ - 48	valley		3.9/6.9	G	9.3	15	34	4	1	30
DJ - 49	valley	57/72	2.9/6.5	G	6.5	16	35	35	1,4	0
DJ - 50	valley	42/65	2.7/4.3	G	7.6	16	38	38	1,3	0
DJ - 51	valley		3.6/5.6	G		8	39	39	1,3	0
DJ - 52	valley	62/62	3.4/5.0	G	4.2	10	20	1	1	19
DJ - 53	highlands		3.6/5.1	S		25	35	35	1,2,3	0
DJ - 54	valley		3.3/8.2	G		17	26	5	1	21
DJ - 55	valley		2.7/4.5	G	5.6	10	37	37	1,2,3	0
DJ - 56	valley		4.1/6.2	G	1.9	4	38	9	1	29
DJ - 58	valley				.6	0	32	7	1	25
DJ - 59	highlands		2.7/4.0	S	10.3	22	35	35	1,2,3	0
DJ - 60	valley			G		3	33	2	1	31
DJ - 62	highlands		2.8/4.7	G		10	29	<0.5	1	29
DJ - 63	valley		4.0/5.5	G	5.9	8	36	36	1,3	0
DJ - 64	valley			G			35	35	1,3	0
DJ - 65[7]	valley		3.4/6.2	G						
DJ - 66	valley		3.3/8.0	G	10.6	25	39	39	1,2,3	0
DJ - 67[7]	highlands		1.9/4.7	S						
DJ - 69	highlands		2.7/5.0	S	5.8	17	32	32	1,2,3	0
DJ - 70	highlands	7/72	1.9/5.0	S	5.9	12	37	37	1,2,3	0
DJ - 71[7]	highlands			S						
DJ - 72	valley	15/66	3.0/4.2	S	9.4	20	40	40	1,3	0
DJ - 73	highlands	23/70	2.6/4.2	S	11.1	22	45	45	1,2,3	0
DJ - 74	valley			G		1	26	1	1	25
DJ - 75	valley			G		2	28	1	1	27
DJ - 77	highlands			G		5	22	2	1	20

[1] Distinction between valley and highlands location is based on 5100 to 5150 m isobaths, but with some adjustment for local relief. A blank indicates that the sample is located out of the area, such that its bathymetric location cannot be related to the main valley.

[2] Nodule mineralogy lists the peak height ratio of the 9.8 Å todorokite peak to the 2.41 Å δ-MnO_2 peak.

[3] Surface textures are identified as granular (G), or smooth (S).

[4] The thickness of Quaternary section (and Tertiary) was ascertained from lithologic properties as well as paleontology.

[5] For identification and list of properties, see Figure 6.

[6] No sediment was recovered with nodules.

[7] Sediment was discarded at time of collection. Shipboard description suggests the sediment was similar to core DJ - 63.

Table 3. Major oxide composition of DOMES Site A bulk sediment and sediment residues (in weight percent). The residues are the insoluble fraction of the leaching technique (see text).

BULK SEDIMENT

CORE	DEPTH INTERVAL (cm)	SIO2	AL2O3	FE2O3	MGO	CAO	NA2O	K2O	TIO2	P2O5	MNO2	LOI
DJ02	0-03	54.88	11.65	6.24	2.52	1.74	2.54	2.39	0.65	0.66	0.903	
"	8-10	56.93	12.06	6.55	2.62	1.78	2.61	2.41	0.67	0.68	0.932	
" T	17-19	57.88	11.71	6.66	2.92	2.05	1.89	2.17	0.61	0.83	1.049	
" T	28-30	58.56	9.43	5.86	2.72	2.26	2.56	1.63	0.45	0.93	1.518	
DJ11	0-02	50.55	12.57	6.91	3.15	1.99	2.84	2.53	0.68	0.76	2.068	
" T	5-07	51.51	12.72	7.29	3.33	2.08	2.76	2.53	0.68	0.79	1.979	
" T	18-20	47.41	10.29	7.15	3.91	2.59	4.01	1.93	0.49	1.12	1.683	
DJ12	0-03	52.86	12.55	7.01	3.03	1.97	2.84	2.44	0.69	0.70	1.262	
" T	6-08	52.53	12.63	7.71	3.40	2.19	2.56	2.36	0.70	0.83	1.389	
" T	16-18	49.23	8.86	7.47	4.06	3.19	3.74	1.29	0.37	1.34	1.541	
DJ15	0-02	55.55	13.28	6.35	2.57	1.38	2.79	2.59	0.67	0.36	0.664	
"	12-14	56.89	13.09	6.65	2.70	1.32	2.64	2.70	0.72	0.34	0.327	
"	22-24	56.21	13.50	6.65	2.65	1.35	2.72	2.75	0.73	0.37	0.306	
"	35-37	55.70	13.23	6.37	2.60	1.35	2.97	2.65	0.70	0.39	0.520	
DJ16	0-03	55.56	13.05	6.40	2.64	1.35	2.98	2.66	0.70	0.38	0.518	
"	15-17	56.56	13.07	6.75	2.73	1.37	2.64	2.67	0.72	0.40	0.213	
"	28-30	55.80	13.68	6.40	2.74	1.37	2.68	2.64	0.71	0.38	0.146	
"	36-38	56.86	13.68	6.68	2.70	1.39	2.45	2.75	0.73	0.39	0.288	
DJ18	0-02	55.30	12.76	6.27	2.57	1.47	3.05	2.52	0.66	0.42	0.796	
"	10-12	56.98	13.03	6.57	2.60	1.45	2.72	2.67	0.73	0.40	0.467	
"	20-22	57.33	13.35	6.78	2.68	1.47	2.56	2.69	0.72	0.42	0.341	
"	30-32	56.88	13.31	6.81	2.65	1.40	2.29	2.71	0.73	0.45	0.309	
DJ23	2-04	50.79	11.92	5.92	2.75	6.62	2.52	2.42	0.64	0.39	0.649	
"	14-16	44.20	10.77	5.40	3.09	14.27	2.15	2.24	0.57	0.45	0.314	
"	25-27	48.56	11.86	5.90	2.98	9.58	2.24	2.39	0.62	0.43	0.233	
"	39-41	56.20	14.12	6.76	2.73	1.28	2.40	2.85	0.74	0.38	0.494	
DJ25	0-03	54.81	11.77	6.43	2.63	2.26	2.50	2.30	0.64	0.96	1.134	
" T	11-13	52.95	12.03	7.26	3.05	2.36	2.76	2.19	0.60	1.02	0.696	
" T	19-21	52.59	11.88	7.30	3.04	2.37	2.41	2.15	0.60	1.01	1.941	
" T	30-32	51.89	11.07	7.20	3.05	2.51	2.66	1.91	0.52	1.00	1.836	
DJ29	0-03	55.86	11.24	6.03	2.52	2.16	2.63	2.17	0.60	0.84	0.934	
" T	15-17	56.45	10.52	5.64	2.90	2.13	2.37	1.61	0.46	0.92	1.522	
DJ34	0-03	53.20	12.32	6.00	2.61	4.05	2.62	2.50	0.66	0.37	0.694	
"	16-18	44.98	10.52	5.34	3.02	13.71	2.32	2.21	0.54	0.45	0.123	
"	30-32	56.67	13.29	6.40	2.66	1.56	2.61	2.73	0.70	0.37	0.114	
DJ35	0-03	51.88	12.99	6.86	2.95	2.02	2.64	2.54	0.72	0.76	2.460	
" T	8-10	49.84	12.73	6.87	3.55	2.80	2.59	2.13	0.63	1.27	1.770	
" T	20-22	45.81	12.27	6.71	3.96	3.33	2.98	1.79	0.56	1.54	2.670	
DJ66	4-06	57.6	12.8	6.39	3.0	1.37	1.2	2.45	0.65	0.4	0.87	11.65
"	10-12	57.3	13.0	6.57	3.0	1.30	1.3	2.51	0.67	0.4	0.81	11.60
"	26-28	57.9	13.3	6.73	3.1	1.33	1.3	2.59	0.69	0.4	0.21	11.15

SEDIMENT RESIDUES

CORE	(cm)	SiO2	AL2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO2	LOI
DJ15	12-14	60.6	12.8	6.73	2.7	0.69	0.7	2.20	0.70	<0.1	0.05	10.89
"	22-24	60.3	13.4	6.77	2.7	0.72	0.7	2.24	0.71	<0.1	0.05	11.08
"	35-37	60.1	13.3	6.72	2.7	0.68	0.7	2.22	0.69	<0.1	0.05	10.96
DJ18	10-12	61.4	13.0	6.87	2.7	0.71	0.7	2.23	0.72	<0.1	0.05	10.82
"	20-22	60.3	13.1	6.91	2.8	0.70	0.7	2.18	0.69	<0.1	0.05	11.21
"	30-32	60.3	13.3	6.91	2.8	0.66	0.7	2.23	0.70	<0.1	0.05	10.98
DJ35	0-03	58.4	13.5	7.19	2.9	0.75	0.7	2.18	0.72	<0.1	0.09	11.46
" T	8-10	55.9	13.5	7.25	3.4	0.76	0.6	1.72	0.61	0.1	0.10	13.45
" T	20-22	53.7	13.6	7.41	3.7	0.90	0.5	1.35	0.55	0.3	0.14	14.96
DJ66	2-04	61.3	12.5	6.48	2.6	0.71	0.7	2.11	0.70	<0.1	0.05	11.09
"	8-10	61.5	12.4	6.30	2.6	0.73	0.7	2.10	0.70	<0.1	0.05	10.84
"	24-26	61.1	12.8	6.56	2.7	0.76	0.7	2.16	0.72	<0.1	0.04	10.80

T = Tertiary sediment, undesignated intervals imply Quaternary sediment.

Table 4. Neutron activation analysis of bulk sediment. Fe is in weight percent and all other concentrations are in ppm.

Core	DJ12	DJ15	DJ15	DJ15	DJ15	DJ15	DJ15	DJ15	DJ15	DJ15
Depth	15-17	1-2	2-3	3-4	5-6	10-11	12-14	15-16	22-24	35-37
Fe	4.84	4.25	4.25	4.35	4.29	4.41	4.72	4.63	4.65	4.63
Ba	11271.	4384.	4225.	4295.	3975.	3875.	3790.	3810.	4115.	4340.
Co	63.4	75.8	83.0	72.3	68.2	61.2	57.0	66.8	80.2	79.8
Cr	22.6	58.2	56.4	60.4	58.1	61.4	61.7	60.7	60.1	61.9
Cs	2.7	7.3	7.2	7.4	7.7	7.8	8.1	7.6	8.2	8.1
Hf	3.1	3.6	3.6	3.6	3.7	3.8	4.0	4.0	4.0	3.9
Rb	51.	82.	77.	84.	81.	85.	86.	87.	87.	92.
Sb	2.7	2.3	2.0	2.2	2.0	2.0	1.9	2.0	2.0	1.9
Te	<.90	.80	.78	.85	.83	.86	.88	.86	.89	.86
Th	4.7	11.9	11.5	12.0	12.1	12.5	12.5	12.7	12.8	13.1
U	2.7	1.9	1.3	1.8	1.8	1.8	1.7	1.9	1.8	1.8
Zn	233.	150.	131.	131.	128.	133.	138.	132.	131.	130.
Zr	<500.	120.	105.	170.	260.	90.	210.	120.	200.	200.
Sc	28.27	25.3	25.6	26.1	25.8	26.6	27.4	27.0	27.6	27.1
La	107.	55.	54.	57.	56.	58.	58.	60.	63.	65.
Ce	56.	78.	79.	81.	79.	79.	79.	84.	82.	84.
Nd	103.	59.	67.	64.	61.	68.	66.	69.	70.	77.
Sm	26.6	16.6	15.8	16.6	16.3	17.6	17.5	17.2	18.6	19.5
Eu	5.72	3.54	3.53	3.64	3.52	3.75	3.72	3.79	3.97	4.11
Gd	24.0	15.1	16.0	16.6	15.6	17.1	16.1	17.2	17.8	18.6
Tb	4.68	2.65	2.69	2.92	2.55	2.75	2.94	2.84	3.33	3.38
Ho	4.4	2.6	3.0	3.4	3.7	3.3	2.7	2.7	3.4	3.2
Tm	1.92	1.10	1.13	1.14	1.07	1.17	1.09	1.11	1.25	1.26
Yb	13.8	8.2	8.0	8.3	7.7	8.5	8.4	8.6	9.1	9.3
Lu	2.05	1.14	1.11	1.16	1.13	1.12	1.20	1.21	1.32	1.30

Core	DJ15	DJ18	DJ18	DJ18	DJ18	DJ35	DJ35	DJ35	DJ35	DJ35
Depth	41-43	2-4	12-14	22-24	32-34	1-2	2-3	3-4	4-5	7-8
Fe	4.51	4.23	4.7	4.74	4.69	4.73	4.61	4.62	4.50	4.24
Ba	4170.	3553.	3410.	3305.	3160.	3920.	4420.	5330.	7400.	9050.
Co	111.	80.3	73.2	92.1	72.4	113.	92.4	108.	107.	97.7
Cr	57.6	56.9	64.3	62.5	63.6	55.2	55.2	52.5	32.2	26.7
Cs	7.9	7.2	8.0	7.8	7.8	6.7	7.0	6.4	4.5	3.9
Hf	4.0	3.5	3.9	4.0	4.2	3.8	4.0	4.1	3.9	3.8
Rb	85.	80.	85.	83.	77.	83.	80.	80.	59.	50.
Sb	1.8	2.3	1.9	2.1	1.9	2.7	2.3	2.9	4.4	4.3
Ta	.96	1.04	.90	.83	.84	.88	.84	.68	.71	.66
Th	12.8	12.9	13.4	13.6	13.2	13.6	13.5	13.2	9.2	7.6
U	2.0	1.9	1.8	1.6	1.6	2.0	1.9	2.1	1.8	2.2
Zn	119.	140.	143.	132.	138.	190.	166.	189.	247.	243.
Zr	70.	<500.	125.	150.	200.	200.	100.	200.	60.	320.
Sc	26.8	25.21	27.7	27.9	28.0	30.9	30.1	32.3	34.7	33.3
La	66.	61.	66.	72.	71.	85.	88.	103.	134.	134
Ce	85.	80.	84.	88.	74.	81.	85.	87.	76.	69.
Nd	77.	73.	71.5	87.	83.	95.	104.	108.	150.	132.
Sm	19.7	19.1	20.2	21.6	21.2	27.0	27.7	30.3	37.9	34.5
Eu	4.21	4.00	4.39	4.71	4.30	5.81	5.87	6.59	8.07	7.65
Gd	19.5	16.5	19.7	20.7	1.9	24.9	28.5	29.8	35.3	35.3
Tb	3.28	3.34	2.84	3.42	3.59	4.49	4.75	5.31	6.59	6.32
Ho	3.3	3.5	3.5	3.9	4.6	4.0	5.8	4.6	8.4	8.1
Tm	1.29	1.25	1.45	1.55	.13	1.58	1.63	2.21	2.25	2.24
Yb	9.5	8.9	9.4	10.9	10.8	13.0	14.0	15.4	20.3	17.3
Lu	1.37	1.32	1.45	1.58	1.53	2.10	1.98	2.16	'2.76	2.45

Core	DJ35	DJ35	DJ35	DJ35	DJ35	DJ66	DJ66	DJ66	DJ66	DJ66
Depth	8-10	10-21	15-16	20-22	35-36	2-4	4-6	6-8	10-12	26-28
Fe	4.36	4.91	4.34	4.73	4.15	4.67	4.38	4.75	4.54	4.80
Ba	8930.	7890.	9060.	10300.	6060.	3640.	4050.	3720.	3970.	3260.
Co	108.	117.	88.5	101.	78.0	87.8	91.8	89.8	90.8	48.6
Cr	29.5	40.5	25.3	26.2	31.7	66.8	66.2	64.6	66.3	67.7
Cs	4.0	5.4	3.7	3.6	3.9	8.0	7.1	8.0	7.8	8.3
Hf	4.1	4.4	3.9	4.7	3.9	3.8	3.7	3.9	3.9	4.0
Rb	53.	69.	45.	55.	49.	82.	84.	86.	83.	82.
Sb	3.2	3.8	3.7	4.1	2.5	2.1	2.0	2.2	2.2	3.3
Ta	.50	.66	.68	.75	.74	.83	.83	.98	.83	.77
Th	8.6	10.9	7.5	7.9	7.8	12.0	12.5	12.0	12.3	12.5
U	2.1	2.4	2.2	2.9	2.3	1.8	1.8	1.6	1.9	1.8
Zn	220.	253.	233.	282.	195.	154.	151.	141.	151.	137.
Zr	200.	370.	330.	100.	200.	—	160.	180.	200.	350.
Sc	33.8	37.0	33.3	37.5	30.6	27.2	25.4	27.1	26.4	27.6
La	142.	135.	132.	161.	119.	58.	59.	59.	60.	60.
Ce	78.	83.	72.	84.	71.	84.	82.	91.	85.	87.
Nd	139.	158.	141.	170.	128.	64.	68.	64.	64.	67.
Sm	37.1	40.0	33.5	45.5	31.9	16.7	18.2	16.8	18.0	17.2
Eu	7.98	8.49	7.58	9.02	6.86	3.68	3.85	3.63	3.78	3.82
Gd	35.8	35.0	35.5	39.3	30.7	16.4	16.1	16.7	16.3	16.1
Tb	6.45	7.09	6.11	7.20	5.41	3.02	3.03	2.90	3.19	3.02
Ho	9.4	9.0	8.1	10.0	7.8	2.7	2.8	2.3	3.0	4.0
Tm	2.26	2.23	2.42	2.54	1.89	1.36	1.28	1.15	1.33	1.44
Yb	17.7	20.4	16.4	21.7	15.6	8.4	8.8	7.9	8.5	8.5
Lu	2.59	2.52	2.32	3.06	2.22	1.24	1.29	1.24	1.25	1.25

Table 5. Neutron activation analysis of sediment residues, i.e. the fraction insoluble in HH-AA (see text for procedure). Fe is in weight percent; the other elemental concentrations are in ppm. Sediment depths are in centimeters.

Core Depth	DJ15 12-14	DJ15 22-24	DJ15 35-37	DJ18 10-12	DJ18 20-22	DJ18 30-32
Fe	4.84	4.90	4.92	4.99	4.85	4.89
Ba	4000.	4200.	4395.	3460.	3335.	3400.
Co	20.8	15.1	14.7	16.5	16.5	16.2
Cr	70.0	69.1	68.7	71.0	67.2	68.7
Cs	8.3	8.3	8.5	8.8	7.9	8.4
Hf	4.0	4.1	4.0	4.0	4.0	4.0
Rb	89.	88.	90.	89.	86.	87.
Sb	2.0	1.8	1.9	2.2	2.1	1.9
Ta	.92	.90	.90	.88	.88	.92
Th	12.4	12.7	12.1	13.4	12.7	13.0
U	1.5	1.5	1.6	1.5	1.5	1.7
Zn	137.	136.	129.	134.	127.	130.
Zr	100.	210.	195.	190.	155.	145.
Sc	28.8	28.9	28.7	29.9	28.3	28.2
La	23.	23.	23.	24.	23.	24.
Ce	44.	45.	47.	50.	45.	49.
Nd	21.	22.	21.	21.	19.	19.
Sm	3.8	3.8	4.0	4.3	3.7	3.8
Eu	.79	.75	.74	.82	.73	.73
Gd	<4.0	<4.0	2.7	2.8	4.7	4.9
Tb	.50	.52	.55	.57	.50	.44
Ho	.6	.7	.6	.6	.5	.6
Tm	.25	.57	.49	.42	.41	.27
Yb	2.0	2.0	1.9	2.3	2.0	2.0
Lu	.33	.31	.31	.35	.31	.31

Core Depth	DJ35 0-3	DJ35 8-10	DJ35 20-22	DJ66 4-6	DJ66 10-12	DJ66 26-28
Fe	4.99	5.44	5.47	4.40	4.83	4.76
Ba	4630.	8380.	11000.	3250.	3310.	3180.
Co	16.6	12.9	8.6	13.9	15.4	16.1
Cr	65.0	52.4	34.4	66.3	72.8	72.7
Cs	7.7	5.9	3.9	7.8	8.4	8.2
Hf	4.4	4.9	5.4	3.6	3.9	3.9
Rb	81.	71.	52.	88.	87.	91.
Sb	2.5	2.9	3.1	1.9	2.1	1.6
Ta	.85	.85	.73	.81	.91	.90
Th	14.0	10.9	8.5	11.5	12.7	13.0
U	1.5	1.5	1.1	1.5	1.4	1.6
Zn	145.	207.	238.	121.	134.	125.
Zr	210.	380.	260.	160.	100.	220.
Sc	32.8	40.2	43.7	25.8	28.5	27.0
La	28.	38.	60.	23.	24.	25.
Ce	56.	47.	47.	46.	50.	55.
Nd	27.	32.	64.	20.	20.	22.
Sm	6.5	9.2	15.5	4.2	4.2	4.6
Eu	1.26	1.90	3.22	.78	.85	.81
Gd	6.0	6.4	12.9	3.6	2.8	4.5
Tb	.93	1.26	2.01	.50	.62	.55
Ho	.9	1.4	3.3	.4	.6	.8
Tm	.68	.82	.98	.33	.56	.44
Yb	3.5	4.6	6.9	2.2	2.2	2.3
Lu	.51	.64	1.02	.34	.35	.35

Table 6. Comparison of NAA, XRF, and AAS analyses for Fe in 27 pelagic sediment samples and for Fe, Co, and Zn in 20 ferromanganese nodule samples from DOMES Site A. The final nodule sample is nodule standard NOD-P-1. All analyses are in weight percent.

Sediment		Nodules					
Fe		Fe		Co		Zn	
NAA	XRF	NAA	AAS	NAA	AAS	NAA	AAS
4.84	5.22	5.39	8.61	.18	.15	.08	.09
4.25	4.44	4.64	7.85	.14	.16	.11	.13
4.72	4.65	6.10	9.17	.23	.16	.09	.15
4.65	4.65	4.78	8.20	.17	.16	.09	.10
4.63	4.45	4.98	7.93	.18	.18	.11	.11
4.23	4.38	4.96	7.99	.15	.14	.09	.12
4.70	4.59	9.71	13.0	.24	.26	.06	.06
4.75	4.74	9.14	9.65	.22	.19	.07	.07
4.70	4.76	6.86	9.65	.18	.18	.07	.07
4.61	4.80	10.86	11.3	.21	.23	.06	.06
4.24	4.80	9.83	12.3	.28	.31	.07	.07
4.73	4.69	5.59	8.93	.15	.16	.09	.09
4.38	4.47	5.93	8.52	.17	.16	.09	.10
4.54	4.59	5.17	7.89	.18	.18	.11	.11
4.80	4.71	5.37	7.80	.19	.18	.11	.11
4.84	4.71	6.08	7.66	.15	.14	.09	.09
4.90	4.73	5.37	7.16	.11	.10	.09	.09
4.92	4.70	10.83	9.65	.29	.19	.07	.07
4.99	4.80	7.05	9.42	.17	.16	.17	.17
4.85	4.83	6.66	9.11	.17	.17	.09	.08
4.89	4.83	5.76*	6.45	.18	.22	.134**	.140
4.99	5.03						
5.44	5.07						
5.47	5.18						
4.40	4.53						
4.83	4.40						
4.76	4.59						

* Best value given by Flanagan and Gottfried (1980) is : Fe = 5.78, Co = 0.224, Zn = 0.16. The AAS values for Cu and Ni (1.11 and 1.26% respectively, also agree well with the best values given by Flanagan and Gottfried (1.15 and 1.34% respectively). The Mn value measured by AAS (27.3% is lower than the "best" value (29.14%) by 6%. The slightly low values for Mn, Ni, Cu, Zn, and possibly Co may reflect variation in pre-treatment. The samples gained approximately 10% moisture in 24 hrs exposure to the atmosphere. The AAS values would reflect this additional weight as no pre-drying was carried out on the samples. Analyses of P-1 carried out in other laboratories were performed on samples dried at $110^{\circ}C$ for 24 hrs. When the AAS values for standard nodule A-1 are increased by 10%, all elemental concentrations, including Fe, agree closely with the "best" values.

** Value not reported in Flanagan and Gottfried (1980).

Table 7. Composition of the fraction of sediment soluble in HH-AA. Cu, Ni, Co, and Zn are reported in ppm; the other elements are in weight percent. The depth intervals are in cm.

Core	Depth	Cu	Ni	Co	Zn	Mg	Mn	Fe	Si	Al	Ca	K
DJ01	0.0- 1.0	409.	417.	92.	161.	0.67	1.02	0.34	0.30	0.70	0.74	0.60
"	1.0- 2.0	173.	146.	69.	35.	0.67	0.46	0.32	0.28	0.67	0.84	0.57
"	2.0- 3.0	210.	186.	74.	32.	0.72	0.56	0.34	0.30	0.67	0.73	0.57
"	3.0- 4.0	228.	214.	72.	34.	0.71	0.59	0.33	0.29	0.70	0.79	0.54
"	4.0- 5.0	240.	229.	73.	34.	0.66	0.64	0.32	0.29	0.67	0.72	0.54
"	6.5- 7.5	356.	414.	64.	48.	0.61	1.05	0.24	0.22	0.37	0.70	0.50
"	9.0-10.0	196.	304.	53.	40.	0.69	0.83	0.22	0.20	0.35	0.74	0.48
"	14.0-15.0	113.	24.	50.	32.	0.65	0.62	0.21	0.20	0.35	0.75	0.53
"	24.0-25.0	73.	162.	41.	25.	0.66	0.56	0.18	0.18	0.32	0.71	0.45
"	34.5-35.5	73.	134.	44.	24.	0.62	0.52	0.15	0.18	0.30	0.67	0.42
DJ02	0.0- 1.0	230.	219.	74.	36.	0.72	0.60	0.31	0.30	0.60	0.94	0.59
"	1.0- 2.0	190.	177.	73.	28.	0.69	0.50	0.30	0.30	0.65	0.84	0.62
"	2.0- 3.0	189.	177.	72.	27.	0.69	0.50	0.31	0.30	0.67	0.86	0.59
"	4.0- 5.0	176.	152.	64.	26.	0.66	0.46	0.29	0.28	0.62	0.83	0.59
"	6.5- 7.5	163.	137.	62.	25.	0.67	0.44	0.28	0.27	0.65	0.80	0.59
"	9.0-10.0	156.	129.	67.	25.	0.62	0.45	0.28	0.26	0.62	0.82	0.54
"	14.0-15.0	138.	122.	72.	25.	0.63	0.52	0.26	0.25	0.55	0.91	0.54
"	19.0-20.0	179.	157.	67.	37.	0.56	1.16	0.24	0.12	0.17	1.20	0.49
"	24.0-25.0	106.	297.	65.	48.	0.74	1.03	0.12	0.18	0.27	1.14	0.51
"	29.0-30.0	108.	147.	67.	30.	0.57	0.92	0.26	0.13	0.20	1.22	0.47
"	34.0-35.0	103.	135.	65.	24.	0.56	0.84	0.29	0.13	0.22	1.22	0.47
"	39.0-40.0	96.	128.	63.	27.	0.53	0.80	0.25	0.12	0.20	1.14	0.45
"	41.0-42.0	72.	205.	64.	35.	0.71	0.73	0.13	0.18	0.25	1.08	0.50
DJ11	0.0- 1.0	310.	399.	82.	52.	0.92	0.96	0.48	0.35	0.65	1.04	0.71
"	1.0- 2.0	264.	390.	72.	49.	0.95	0.99	0.43	0.32	0.55	1.20	0.76
"	2.0- 3.0	353.	511.	94.	64.	1.03	1.26	0.42	0.33	0.53	1.29	0.83
"	4.0- 5.0	499.	704.	114.	94.	1.23	1.75	0.52	0.32	0.39	1.47	0.97
"	6.5- 7.5	194.	366.	57.	54.	1.27	1.05	0.43	0.32	0.40	1.51	0.86
"	9.0-10.0	141.	258.	61.	38.	1.04	0.79	0.38	0.29	0.45	1.24	0.72
"	14.0-15.0	133.	287.	51.	48.	1.36	0.94	0.42	0.32	0.30	1.50	0.85
"	24.0-25.0	114.	241.	52.	48.	1.25	0.83	0.45	0.33	0.34	1.46	0.74
"	28.5-29.5	113.	255.	54.	49.	1.43	0.92	0.43	0.30	0.36	1.38	0.64
DJ12	0.0- 1.0	283.	394.	75.	51.	0.89	1.02	0.34	0.28	0.37	1.18	0.51
"	1.0- 2.0	196.	344.	85.	38.	0.88	0.92	0.32	0.26	0.32	1.17	0.46
"	2.0- 3.0	175.	303.	77.	35.	0.91	0.88	0.31	0.26	0.30	1.16	0.49
"	3.0- 4.0	329.	479.	75.	58.	0.97	1.27	0.30	0.25	0.27	1.24	0.48
"	4.0- 5.0	939.	1298.	230.	139.	1.01	2.38	0.30	0.23	0.27	1.25	0.47
"	6.5- 7.5	168.	172.	69.	29.	0.72	0.54	0.32	0.31	0.62	0.78	0.51
"	9.0-10.0	800.	1074.	128.	134.	0.99	2.26	0.28	0.23	0.22	1.22	0.50
"	14.0-15.0	117.	224.	69.	32.	1.01	0.87	0.30	0.25	0.22	1.31	0.46
"	26.0-27.0	108.	207.	63.	29.	0.92	0.85	0.38	0.27	0.25	1.39	0.46

Table 7. cont.

Core	Depth	Cu	Ni	Co	Zn	Mg	Mn	Fe	Si	Al	Ca	K
DJ15	0.0- 1.0	164.	127.	62.	35.	0.70	0.39	0.30	0.23	0.77	0.57	0.58
"	1.0- 2.0	162.	115.	68.	34.	0.67	0.39	0.31	0.28	0.72	0.55	0.61
"	3.0- 4.0	142.	101.	52.	20.	0.67	0.32	0.28	0.26	0.77	0.53	0.59
"	2.0- 3.0	152.	117.	59.	22.	0.70	0.35	0.29	0.27	0.77	0.56	0.60
"	4.0- 5.0	153.	109.	56.	20.	0.70	0.34	0.27	0.26	0.80	0.55	0.63
"	6.5- 7.5	148.	104.	59.	20.	0.68.	0.33	0.26	0.26	0.77	0.54	0.64
"	9.0-10.0	127.	82.	53.	20.	0.71	0.26	0.22	0.24	0.75	0.53	0.61
"	14.0-15.0	102.	52.	36.	15.	0.67	0.18	0.23	0.24	0.77	0.52	0.61
"	19.0-20.0	100.	20.	75.	8.	0.45	0.18	0.28	0.14	0.45	0.51	0.58
"	24.0-25.0	120.	45.	82.	14.	0.64	0.20	0.25	0.25	0.75	0.50	0.60
"	29.0-30.0	103.	17.	64.	10.	0.42	0.17	0.28	0.14	0.42	0.50	0.58
"	34.0-35.0	121.	27.	99.	18.	0.43	0.23	0.34	0.17	0.47	0.53	0.59
"	39.0-40.0	118.	28.	97.	9.	0.41	0.24	0.28	0.14	0.37	0.53	0.58
"	41.5-42.5	125.	57.	96.	14.	0.59	0.27	0.23	0.25	0.72	0.53	0.63
DJ18	0.0- 1.0	209.	197.	72.	39.	0.71	0.52	0.32	0.28	0.72	0.67	0.57
"	1.0- 2.0	176.	149.	67.	23.	0.72	0.43	0.30	0.27	0.85	0.62	0.61
"	2.0- 3.0	182.	152.	68.	23.	0.75	0.43	0.31	0.28	0.77	0.68	0.64
"	3.0- 4.0	164.	142.	65.	21.	0.71	0.40	0.29	0.26	0.72	0.62	0.60
"	4.0- 5.0	174.	147.	67.	24.	0.73	0.42	0.30	0.27	0.73	0.61	0.67
"	6.5- 7.5	148.	129.	58.	21.	0.72	0.38	0.28	0.26	0.69	0.59	0.57
"	9.0-10.0	120.	92.	73.	18.	0.77	0.30	0.27	0.27	0.70	0.60	0.65
"	14.0-15.0	109.	67.	76.	16.	0.70	0.24	0.28	0.27	0.67	0.57	0.59
"	24.0-25.0	66.	20.	28.	12.	0.60	0.07	0.17	0.23	0.72	0.58	0.63
"	40.0-41.0	108.	83.	110.	16.	0.84	0.36	0.27	0.27	0.70	0.62	0.58
DJ21	0.0- 1.0	161.	122.	70.	26.	0.71	0.39	0.32	0.28	0.80	0.57	0.63
"	1.0- 2.0	148.	114.	66.	20.	0.94	0.38	0.32	0.28	0.87	0.55	0.63
"	2.0- 3.0	151.	132.	70.	22.	0.70	0.47	0.31	0.28	0.72	0.59	0.60
"	3.0- 4.0	133.	117.	68.	22.	0.77	0.39	0.28	0.24	0.60	1.14	0.53
"	4.0- 5.0	110.	85.	53.	18.	0.75	0.27	0.26	0.23	0.62	1.43	0.56
"	6.5- 7.5	100.	27.	35.	14.	0.80	0.10	0.25	0.24	0.65	1.48	0.57
"	9.0-10.0	157.	112.	75.	21.	0.68	0.40	0.28	0.28	0.75	0.56	0.59
"	14.0-15.0	100.	57.	32.	16.	0.70	0.17	0.24	0.26	0.74	0.50	0.59
"	19.0-20.0	108.	26.	75.	45.	0.47	0.21	0.38	0.16	0.45	0.57	0.57
"	24.0-25.0	77.	22.	36.	14.	0.68	0.10	0.23	0.26	0.74	0.52	0.62
"	29.0-30.0	102.	20.	65.	16.	0.46	0.16	0.31	0.13	0.42	0.51	0.60
"	34.0-35.0	105.	20.	67.	8.	0.43	0.17	0.30	0.14	0.40	0.49	0.58
"	40.0-41.0	122.	52.	83.	14.	0.56	0.25	0.25	0.27	0.60	0.50	0.60
DJ23	0.0- 1.0	153.	110.	66.	19.	0.64	0.37	0.24	0.26	0.55	3.56	0.58
"	1.0- 2.0	131.	95.	56.	16.	0.65	0.32	0.19	0.22	0.42	6.18	0.58
"	2.0- 3.0	161.	114.	62.	18.	0.67	0.37	0.23	0.26	0.52	3.75	0.58
"	3.0- 4.0	156.	114.	61.	17.	0.65	0.36	0.24	0.24	0.55	4.01	0.56
"	4.0- 5.0	152.	107.	55.	16.	0.71	0.35	0.21	0.24	0.52	4.58	0.58
"	6.5- 7.5	152.	109.	62.	17.	0.65	0.34	0.20	0.22	0.45	5.42	0.52
"	9.0-10.0	108.	70.	51.	13.	1.12	0.23	0.14	0.20	0.32	6.61	1.05
"	14.0-15.0	81.	45.	49.	11.	1.08	0.16	0.22	0.18	0.27	7.61	1.01
"	24.0-25.0	63.	15.	20.	9.	0.55	0.05	0.14	0.16	0.22	9.21	0.49
"	41.0-42.0	185.	102.	118.	14.	0.62	0.36	0.18	0.23	0.50	0.54	0.69

Table 7. cont.

Core	Depth	Cu	Ni	Co	Zn	Mg	Mn	Fe	Si	Al	Ca	K
DJ24	0.0- 1.0	174.	142.	72.	25.	0.75	0.45	0.31	0.26	0.67	0.63	0.64
"	1.0- 2.0	184.	132.	74.	23.	0.76	0.43	0.38	0.34	0.81	0.61	0.68
"	2.0- 3.0	170.	132.	72.	21.	0.73	0.41	0.31	0.28	0.72	0.62	0.65
"	3.0- 4.0	163.	129.	74.	19.	0.83	0.42	0.37	0.24	0.67	0.62	0.63
"	4.0- 5.0	174.	142.	74.	21.	0.72	0.42	0.30	0.26	0.67	0.65	0.70
"	6.5- 7.5	160.	137.	77.	20.	0.70	0.42	0.29	0.25	0.70	0.62	0.68
"	9.0-10.0	187.	142.	80.	21.	0.59	0.45	0.21	0.21	0.47	0.71	0.72
"	14.0-15.0	244.	204.	95.	26.	0.65	0.70	0.23	0.21	0.42	0.74	0.81
"	24.0-25.0	247.	289.	120.	30.	0.65	0.88	0.18	0.18	0.35	0.91	0.84
"	39.0-40.0	221.	294.	115.	33.	0.69	0.79	0.23	0.19	0.42	0.89	0.82
DJ25	0.0- 1.0	223.	179.	68.	44.	0.72	0.62	0.27	0.25	0.60	1.32	0.66
"	1.0- 2.0	194.	157.	66.	26.	0.69	0.52	0.25	0.24	0.57	1.11	0.55
"	2.0- 3.0	158.	122.	68.	21.	0.68	0.46	0.27	0.26	0.65	1.03	0.58
"	3.0- 4.0	145.	120.	69.	19.	0.68	0.42	0.27	0.26	0.62	0.97	0.60
"	4.0- 5.0	141.	120.	65.	20.	0.67	0.41	0.27	0.25	0.65	0.98	0.57
"	6.5- 7.5	86.	55.	36.	16.	0.64	0.21	0.22	0.23	0.55	1.03	0.55
"	9.0-10.0	84.	62.	63.	16.	0.71	0.30	0.27	0.22	0.45	1.10	0.56
"	14.0-15.0	180.	276.	96.	39.	0.80	1.18	0.19	0.19	0.22	1.31	0.54
"	24.0-25.0	90.	261.	70.	34.	0.77	1.02	0.21	0.19	0.22	1.29	0.52
"	42.0-43.0	78.	257.	73.	32.	0.81	1.01	0.18	0.17	0.20	1.23	0.54
DJ28	0.0- 1.0	218.	100.	71.	35.	0.56	0.52	0.52	0.22	0.60	0.96	0.57
"	1.0- 2.0	219.	101.	72.	22.	0.52	0.54	0.42	0.19	0.55	0.94	0.54
"	2.0- 3.0	196.	92.	71.	19.	0.50	0.52	0.33	0.17	0.42	0.95	0.53
"	3.0- 4.0	197.	89.	70.	19.	0.52	0.52	0.38	0.18	0.45	0.94	0.54
"	4.0- 5.0	174.	80.	70.	17.	0.45	0.48	0.32	0.17	0.42	0.93	0.53
"	6.5- 7.5	203.	91.	66.	21.	0.51	0.58	0.38	0.17	0.45	0.95	0.51
"	9.0-10.0	260.	149.	62.	30.	0.50	1.00	0.24	0.12	0.20	1.01	0.45
"	14.0-15.0	134.	124.	50.	20.	0.53	0.89	0.23	0.11	0.12	0.95	0.49
"	19.0-20.0	96.	122.	55.	17.	0.51	0.93	0.24	0.11	0.12	1.03	0.42
"	24.0-25.0	99.	107.	53.	17.	0.59	0.82	0.33	0.13	0.22	0.97	0.44
"	29.0-30.0	80.	97.	53.	22.	0.54	0.80	0.29	0.12	0.17	1.00	0.42
"	34.0-35.0	91.	108.	55.	23.	0.55	0.85	0.32	0.13	0.22	1.00	0.44
DJ29	0.0- 1.0	202.	182.	72.	29.	0.76	0.59	0.26	0.23	0.55	1.13	0.56
"	1.0- 2.0	179.	162.	67.	25.	0.70	0.55	0.27	0.24	0.55	1.03	0.54
"	2.0- 3.0	183.	179.	67.	26.	0.67	0.57	0.26	0.24	0.52	1.13	0.54
"	3.0- 4.0	187.	169.	69.	24.	0.71	0.62	0.24	0.23	0.47	1.13	0.54
"	4.0- 5.0	233.	256.	78.	38.	0.75	0.95	0.21	0.19	0.37	1.16	0.55
"	6.5- 7.5	166.	233.	69.	43.	0.74	1.00	0.15	0.16	0.22	1.20	0.53
"	9.0-10.0	98.	186.	58.	37.	0.77	0.91	0.12	0.16	0.20	1.18	0.49
"	14.0-15.0	72.	192.	58.	35.	0.77	0.91	0.12	0.16	0.20	1.19	0.47
"	19.0-20.0	86.	97.	60.	24.	0.54	0.82	0.28	0.13	0.20	1.14	0.46
"	24.0-25.0	59.	179.	55.	27.	0.74	0.81	0.12	0.16	0.20	1.13	0.50
"	29.0-30.0	52.	187.	54.	29.	0.72	0.79	0.12	0.15	0.20	1.11	0.47

Table 7. cont.

Core	Depth	Cu	Ni	Co	Zn	Mg	Mn	Fe	Si	Al	Ca	K
DJ34	0.0- 1.0	160.	122.	53.	18.	0.71	0.37	0.26	0.24	0.72	2.14	0.62
"	1.0- 2.0	155.	120.	55.	18.	0.66	0.36	0.24	0.23	0.72	2.57	0.58
"	2.0- 3.0	153.	120.	57.	18.	0.65	0.35	0.20	0.21	0.62	3.86	0.56
"	3.0- 4.0	149.	112.	56.	16.	0.70	0.35	0.22	0.22	0.62	3.61	0.56
"	4.0- 5.0	150.	110.	54.	17.	0.62	0.35	0.20	0.20	0.60	3.74	0.57
"	6.5- 7.5	112.	74.	55.	13.	0.57	0.25	0.13	0.17	0.42	6.10	0.55
"	9.0-10.0	91.	60.	48.	13.	0.48	0.20	0.14	0.17	0.40	7.21	0.48
"	14.0-15.0	54.	20.	14.	9.	0.52	0.06	0.10	0.14	0.35	7.88	0.49
"	19.0-20.0	61.	10.	9.	7.	0.39	0.03	0.23	0.13	0.32	5.04	0.53
"	24.0-25.0	65.	15.	29.	9.	0.55	0.05	0.13	0.17	0.52	2.98	0.58
"	29.0-30.0	63.	5.	16.	6.	0.41	0.03	0.25	0.14	0.42	0.51	0.62
"	35.0-36.0	63.	10.	24.	13.	0.57	0.05	0.16	0.19	0.67	0.54	0.62
DJ35	0.0- 1.0	396.	393.	94.	52.	0.73	1.09	0.33	0.27	0.62	0.94	0.58
"	1.0- 2.0	228.	219.	76.	31.	0.66	0.68	0.29	0.26	0.52	0.92	0.55
"	2.0- 3.0	317.	357.	92.	37.	0.73	0.98	0.29	0.26	0.50	1.07	0.57
"	3.0- 4.0	585.	640.	98.	58.	0.96	1.74	0.26	0.22	0.32	1.49	0.53
"	4.0- 5.0	510.	583.	91.	60.	0.99	1.70	0.26	0.21	0.30	1.60	0.52
"	6.5- 7.5	484.	558.	89.	58.	1.06	1.69	0.22	0.21	0.25	1.65	0.55
"	9.0-10.0	306.	389.	91.	45.	0.99	1.29	0.26	0.21	0.27	1.69	0.57
"	14.0-15.0	308.	450.	82.	52.	1.02	1.56	0.23	0.19	0.20	1.77	0.49
"	19.0-20.0	240.	258.	89.	30.	0.76	1.60	0.33	0.18	0.17	1.55	0.52
"	24.0-25.0	197.	443.	73.	45.	1.03	1.34	0.19	0.20	0.20	1.78	0.53
"	29.0-30.0	206.	236.	81.	45.	0.87	1.35	0.43	0.18	0.27	1.69	0.53
"	34.0-35.0	137.	342.	72.	41.	0.92	1.05	0.25	0.20	0.25	1.63	0.50
DJ36	0.0- 1.0	162.	145.	62.	18.	0.72	0.41	0.27	0.24	0.67	0.52	0.62
"	1.0- 2.0	159.	134.	55.	19.	0.68	0.41	0.28	0.25	0.67	0.51	0.57
"	2.0- 3.0	163.	117.	60.	18.	0.69	0.40	0.26	0.24	0.67	0.50	0.57
"	3.0- 4.0	147.	100.	57.	16.	0.71	0.36	0.26	0.24	0.65	0.52	0.59
"	4.0- 5.0	154.	104.	59.	17.	0.70	0.39	0.24	0.24	0.67	0.53	0.59
"	6.5- 7.5	161.	90.	65.	18.	0.68	0.40	0.25	0.23	0.65	0.50	0.57
"	9.0-10.0	164.	130.	62.	19.	0.66	0.41	0.25	0.22	0.62	0.49	0.61
"	14.0-15.0	101.	52.	73.	14.	0.62	0.24	0.22	0.20	0.55	0.46	0.57
"	19.0-20.0	96.	23.	35.	9.	0.43	0.15	0.23	0.14	0.40	0.49	0.56
"	24.0-25.0	76.	22.	40.	11.	0.63	0.12	0.23	0.20	0.55	0.49	0.64
"	29.0-30.0	108.	23.	87.	11.	0.42	0.21	0.32	0.15	0.40	0.57	0.61
"	34.0-35.0	118.	20.	58.	10.	0.44	0.16	0.39	0.16	0.48	0.50	0.59
"	42.0-43.0	95.	38.	68.	14.	0.63	0.19	0.23	0.21	0.50	0.47	0.63
DJ39	0.0- 1.0	154.	120.	63.	17.	0.71	0.36	0.25	0.23	0.70	0.52	0.62
"	1.0- 2.0	150.	105.	60.	15.	0.70	0.33	0.23	0.23	0.75	0.50	0.61
"	2.0- 3.0	124.	85.	50.	14.	0.66	0.26	0.21	0.21	0.65	0.49	0.59
"	3.0- 4.0	128.	82.	64.	15.	0.64	0.28	0.21	0.22	0.62	0.47	0.59
"	4.0- 5.0	117.	72.	68.	14.	0.66	0.25	0.21	0.20	0.65	0.46	0.60
"	6.5- 7.5	91.	50.	27.	13.	0.60	0.14	0.16	0.18	0.60	0.46	0.62
"	9.0-10.0	74.	32.	75.	12.	0.61	0.10	0.14	0.18	0.54	0.55	0.67
"	14.0-15.0	182.	102.	109.	15.	0.57	0.36	0.16	0.19	0.40	0.63	0.67
"	19.0-20.0	222.	65.	100.	14.	0.42	0.41	0.34	0.16	0.32	0.66	0.69
"	24.0-25.0	292.	207.	168.	20.	0.72	0.75	0.15	0.16	0.27	0.82	0.78
"	29.0-30.0	250.	117.	110.	19.	0.43	0.80	0.29	0.13	0.20	0.85	0.82
"	31.0-32.0	305.	339.	148.	42.	0.74	1.22	0.16	0.15	0.20	0.96	0.83

Table 7. cont.

Core	Depth	Cu	Ni	Co	Zn	Mg	Mn	Fe	Si	Al	Ca	K
DJ38	0.0- 1.0	110.	65.	46.	17.	0.77	0.21	0.21	0.22	0.75	0.66	0.62
"	1.0- 2.0	109.	62.	52.	13.	0.74	0.21	0.20	0.22	0.70	0.65	0.63
"	2.0- 3.0	109.	62.	44.	12.	0.70	0.21	0.23	0.22	0.70	0.64	0.61
"	3.0- 4.0	113.	65.	46.	14.	0.72	0.21	0.20	0.21	0.67	0.68	0.61
"	4.0- 5.0	108.	60.	47.	13.	0.71	0.20	0.19	0.22	0.67	0.69	0.62
"	6.5- 7.5	104.	60.	42.	13.	0.74	0.19	0.19	0.20	0.62	0.62	0.71
"	9.0-10.0	100.	57.	40.	13.	0.65	0.18	0.19	0.20	0.62	0.60	0.60
"	14.0-15.0	80.	35.	30.	11.	0.58	0.11	0.17	0.19	0.57	0.58	0.60
"	19.0-20.0	74.	13.	38.	7.	0.40	0.08	0.25	0.14	0.40	0.57	0.58
"	24.0-25.0	74.	32.	46.	10.	0.61	0.10	0.16	0.20	0.57	0.65	0.58
"	29.0-30.0	92.	25.	69.	9.	0.41	0.14	0.26	0.14	0.32	0.66	0.54
"	34.0-35.0	93.	38.	98.	14.	0.43	0.20	0.28	0.15	0.33	0.65	0.56
"	42.0-43.0	132.	151.	145.	17.	0.62	0.42	0.17	0.19	0.35	0.64	0.53
DJ59	0.0- 2.0	154.	104.	60.	25.	0.19	0.35	0.26	0.15	0.32	3.46	0.60
"	2.0- 4.0	156.	122.	56.	25.	0.19	0.36	0.23	0.15	0.27	4.01	0.45
"	4.0- 6.0	150.	122.	56.	25.	0.14	0.36	0.22	0.14	0.27	5.34	0.34
"	6.0- 8.0	150.	115.	52.	25.	0.15	0.34	0.19	0.14	0.22	4.65	0.37
"	8.0-10.0	105.	75.	52.	20.	0.21	0.24	0.20	0.13	0.22	5.09	0.38
"	10.0-12.0	77.	35.	42.	20.	0.11	0.14	0.14	0.13	0.22	5.56	0.38
"	12.0-14.0	66.	35.	40.	20.	0.12	0.11	0.14	0.11	0.19	6.60	0.34
"	14.0-16.0	56.	20.	36.	15.	0.13	0.07	0.09	0.09	0.19	7.30	0.41
"	16.0-18.0	63.	27.	30.	15.	0.15	0.06	0.10	0.09	0.19	6.94	0.34
"	18.0-20.0	59.	17.	24.	25.	0.15	0.05	0.10	0.09	0.22	4.79	0.36
"	20.0-22.0	76.	17.	46.	40.	0.18	0.07	0.19	0.14	0.34	1.29	0.44
"	24.0-26.0	64.	12.	42.	40.	0.16	0.05	0.14	0.12	0.29	2.63	0.39
"	28.0-30.0	81.	20.	72.	20.	0.20	0.09	0.10	0.13	0.39	0.50	0.38
"	32.0-34.0	78.	22.	52.	20.	0.18	0.08	0.18	0.14	0.41	0.45	0.45
DJ66	0.0- 2.0	208.	147.	68.	12.	0.18	0.43	0.30	0.16	0.42	0.53	0.37
"	2.0- 4.0	212.	170.	78.	17.	0.18	0.51	0.28	0.15	0.44	0.51	0.37
"	4.0- 6.0	195.	152.	72.	10.	0.18	0.50	0.28	0.15	0.44	0.50	0.39
"	6.0- 8.0	207.	154.	74.	17.	0.16	0.51	0.29	0.16	0.49	0.51	0.38
"	8.0-10.0	180.	152.	72.	15.	0.18	0.50	0.29	0.16	0.44	0.51	0.45
"	10.0-12.0	169.	124.	74.	12.	0.17	0.44	0.27	0.15	0.41	0.50	0.36
"	12.0-14.0	112.	70.	62.	8.	0.14	0.25	0.23	0.15	0.42	0.47	0.36
"	14.0-16.0	122.	70.	76.	8.	0.18	0.29	0.29	0.18	0.40	0.51	0.39
"	16.0-18.0	120.	77.	77.	15.	0.19	0.28	0.28	0.16	0.41	0.52	0.42
"	18.0-20.0	94.	40.	76.	5.	0.20	0.19	0.25	0.16	0.39	0.54	0.44
"	20.0-22.0	85.	30.	44.	5.	0.18	0.14	0.23	0.15	0.42	0.50	0.39
"	24.0-26.0	76.	22.	40.	5.	0.22	0.11	0.25	0.14	0.33	0.49	0.41
"	28.0-30.0	106.	43.	64.	5.	0.21	0.19	0.25	0.16	0.35	0.51	0.40
"	32.0-34.0	84.	25.	46.	10.	0.17	0.14	0.24	0.15	0.36	0.52	0.36
"	36.0-38.0	132.	60.	66.	28.	0.17	0.28	0.24	0.16	0.36	0.51	0.35

Table 8. Elemental composition of nodules (in dry weight percent of the total weight of the nodule) recovered in box cores at DOMES Site A. Size gives the maximum nodule dimension (in cm). The analyses were performed by AAS on the nodule fraction soluble in HH-AA.

Core	Size	Cu	Ni	Co	Zn	Mn	Fe
DJ01	6.	1.15	1.31	0.16	0.10	26.2	8.12
DJ02	4.5	1.05	1.13	0.18	0.38	22.4	5.91
DJ02	6.	1.10	1.22	0.17	0.09	25.7	8.61
DJ03	7.	1.25	1.36	0.16	0.13	28.5	7.85
DJ06	6.	1.18	1.23	0.21	0.09	25.6	9.12
DJ07	5.	1.25	1.31	0.15	0.10	27.3	7.93
DJ08	3.5	1.15	1.23	0.24	0.15	23.9	9.17
DJ09	3.	1.31	1.42	0.16	0.10	28.0	8.20
DJ10	4.5	1.10	1.29	0.20	0.34	23.4	6.20
DJ10	6.	1.33	1.33	0.18	0.11	27.6	7.93
DJ10	6.	1.02	1.23	0.18	0.30	23.3	6.71
DJ10	7.	1.13	1.23	0.18	0.30	24.4	5.60
DJ10	9.	1.07	1.27	0.17	0.36	25.0	6.17
DJ11	3.5	0.89	1.19	0.23	0.34	22.0	7.10
DJ12	4.	1.26	1.30	0.14	0.12	25.8	7.99
DJ12	4.5	1.05	1.15	0.17	0.28	22.7	6.16
DJ13	4.5	1.13	1.23	0.15	0.14	23.9	9.24
DJ13	5.	0.94	1.12	0.20	0.35	20.9	6.81
DJ14	4.5	0.50	0.80	0.22	0.06	21.0	9.65
DJ15	4.5	0.61	0.95	0.26	0.07	24.6	13.0
DJ16	5.	1.00	1.17	0.18	0.08	24.9	9.36
DJ17	2.5	1.32	1.50	0.15	0.10	27.5	7.61
DJ17	5.*	0.90	1.01	0.15	0.08	25.3	9.42
DJ18	5.5	1.01	1.17	0.21	0.32	22.8	6.97
DJ19	--	1.27	1.35	0.13	0.13	26.0	4.33
DJ20	3.5	0.74	1.00	0.18	0.07	21.9	9.65
DJ21	6.	0.84	1.11	0.21	0.08	24.8	10.1
DJ22	3.5	0.49	0.79	0.19	0.06	19.3	10.7
DJ23	3.5	0.38	0.57	0.23	0.06	15.7	11.3
DJ24	2.	0.62	0.98	0.31	0.07	24.7	12.3
DJ25	--	1.22	1.37	0.47	0.15	26.9	4.16
DJ26	2.5	0.60	0.76	0.13	0.07	18.8	12.3
DJ26	2.5	1.01	1.18	0.19	0.34	21.1	7.13
DJ27	1.5	1.32	1.50	0.18	0.11	26.5	7.80
DJ27	2.	1.21	1.47	0.18	0.11	27.4	7.89
DJ27	4.	1.02	1.19	0.16	0.10	25.1	8.52
DJ27	4.5	1.05	1.19	0.16	0.09	24.3	8.93
DJ28	2.	0.80	1.04	0.14	0.09	20.6	7.66
DJ28	4.5	1.06	1.16	0.18	0.43	34.0	7.09
DJ29	--	1.10	1.29	0.42	0.14	33.6	7.36
DJ30	3.5	1.12	1.18	0.10	0.08	22.1	7.16
DJ32	4.	0.90	1.03	0.19	0.07	23.3	9.61
DJ34	4.5	0.89	1.02	0.19	0.07	22.3	9.65
DJ34	4.5*	0.52	0.87	0.28	0.07	24.2	12.8
DJ35	6.	1.17	1.23	0.14	0.11	26.3	8.2
DJ36	5.5	0.81	0.98	0.16	0.07	23.6	9.42
DJ37	3.5	0.43	0.75	0.34	0.07	23.6	13.6
DJ39	5.	0.90	1.14	0.17	0.08	23.6	9.11
DJ40	3.5	1.04	1.06	0.26	0.35	20.0	7.66
DJ40	5.5	0.97	1.09	0.21	0.32	22.4	6.21
DJ40	8.	0.87	1.00	0.22	0.32	19.3	6.45
DJ41	4.	1.14	1.19	0.17	0.30	22.5	13.20
DJ41	5.5	1.11	1.19	0.20	0.30	23.5	6.54
DJ41	8.	0.93	1.06	0.18	0.22	22.2	6.42
DJ42	--	1.29	1.39	0.42	0.74	26.8	4.96
DJ44	5.	0.93	1.09	0.23	0.21	21.2	7.16
DJ46	--	1.32	1.42	0.48	0.75	25.8	4.52
DJ47	5.	1.10	1.16	0.19	0.22	21.5	5.95
DJ48	6.	1.06	1.12	0.17	0.25	22.7	5.74
DJ49	2.	1.06	1.11	0.25	0.20	27.4	7.41
DJ49	2.5	1.00	1.12	0.20	0.21	19.9	6.65
DJ49	4.	1.02	1.14	0.21	0.17	23.1	6.82
DJ49	6.	1.03	1.13	0.19	0.23	22.9	7.08
DJ50	4.	0.72	0.96	0.21	0.20	20.0	8.05
DJ52	3.5	1.08	1.26	0.18	0.13	22.4	6.41
DJ56	--	1.28	1.37	0.36	0.11	25.6	3.27
DJ59	--	0.70	1.11	0.70	0.10	24.8	9.50
DJ63	--	1.09	1.35	0.58	0.12	27.7	5.53
DJ65	--	1.01	1.26	0.56	0.21	25.4	5.23
DJ66	--	1.04	1.25	0.50	0.10	22.6	4.50
DJ69	--	0.67	1.02	0.75	0.09	23.9	9.22
DJ70	--	0.72	1.04	0.48	0.10	17.9	4.97
DJ72	--	0.50	0.81	0.74	0.08	22.8	11.5
DJ73	--	0.55	0.89	0.66	0.07	21.6	9.43
DJ11	out[1]	1.01	1.50	0.19	0.03	28.5	11.5
DJ11	in[2]	1.54	1.81	0.21	0.04	32.1	9.47
DJ11	blk[3]	1.13	1.61	0.18	2.97	28.0	10.4
DJ29	out	1.08	1.54	0.16	0.68	27.3	8.40
DJ29	in	1.56	1.73	0.14	0.06	32.9	7.91
DJ29	blk	1.14	1.43	0.14	0.03	26.8	6.94
DJ39	out	0.62	1.08	0.33	0.14	27.5	13.0
DJ39	in	0.55	0.90	0.33	0.03	25.5	12.0

* Designates a buried nodule:
- DJ17, 5 cm diameter nodule recovered at 22 cm depth.
- DJ34, 4.5 cm diameter nodule recovered at 8 cm depth.

1 Outer portion of nodule.
2 Interior portion of nodule.
3 Bulk nodule.

Table 9. Elemental composition (Fe in weight percent and other elements in ppm) of nodules recovered in box cores at DOMES Site A. The maximum dimension of the nodule is given in parenthesis, in centimeters. The analyses were performed by NAA on the bulk nodule.

Core	DJ02 (6)	DJ03 (7)	DJ08 (3.5)	DJ09 (3)	DJ10 (6)	DJ12 (4)	DJ14 (4.5)	DJ15 (4.5)	DJ20 (3.5)	DJ23 (3.5)
Fe	5.39	4.64	6.10	4.78	4.98	4.96	9.14	9.71	6.86	10.86
Ba	2215.	1733.	1917.	1720.	2040.	1655.	1385.	1719.	1914.	1305.
Co	1537.	1437.	2251.	1500.	1801.	1495.	1909.	2381.	1800.	2055.
Hf	4.6	4.0	5.4	3.6	4.2	4.4	9.5	9.5	5.9	11.5
Sb	26.2	33.6	24.7	28.2	30.9	28.4	23.2	26.2	24.4	24.3
Th	13.8	9.4	13.1	10.4	10.9	9.6	24.4	27.0	19.5	25.9
U	1.0	3.3	2.9	3.4	3.7	3.6	5.6	5.9	4.6	3.9
Zn	825.	1058.	907.	915.	1066.	934.	631.	750.	705.	542
Sc	10.60	9.70	12.13	9.90	10.99	10.43	15.37	12.73	13.34	17.22
La	100.	87.	93.	84.	90.	88.	171.	198.	134.	180.
Ce	272.	207.	249.	187.	222.	188.	538.	630.	349.	495.
Nd	117.	112.	113.	104.	101.	104.	184.	209.	145.	171.
Sm	27.3	22.7	25.9	23.4	24.8	24.2	42.5	48.5	35.0	40.7
Eu	6.52	5.54	5.67	5.53	5.92	5.70	9.79	11.81	8.28	9.80
Tb	5.33	4.01	4.04	4.19	4.20	4.32	6.97	8.22	5.50	6.40
Ho	2.9	3.0	3.0	2.5	3.0	2.9	4.6	5.7	4.1	4.3
Yb	14.1	11.4	11.6	11.4	12.4	11.6	18.8	22.1	16.0	17.1
Lu	1.87	1.53	1.51	1.54	1.66	1.63	2.60	3.04	2.24	2.37

Core	DJ24 (2)	DJ27A[2] (4.5)	DJ27B[2] (4)	DJ27C[2] (2)	DJ27D[2] (1.5)	DJ28 (2)	DJ30 (3.5)	DJ34 (4.5)	DJ36 (5.5)	DJ39 (3)
Fe	9.83	5.59	5.93	5.17	5.37	6.08	5.37	10.83	7.05	6.66
Ba	1501.	2436.	2035.	1555.	1604.	1392.	1866.	1771.	2313.	1587.
Co	2773.	1534.	1680.	1766.	1877.	1462.	1142.	2941.	1765.	1697.
Hf	8.4	4.7	5.6	4.0	4.5	5.5	4.4	10.0	6.4	6.0
Sb	28.7	27.0	27.8	33.9	36.3	26.9	26.7	31.7	25.6	27.3
Th	28.1	13.2	13.3	14.1	13.1	14.5	9.5	33.5	16.3	16.4
U	7.1	4.2	5.3	4.4	4.5	3.3	3.3	8.3	1.6	5.6
Zn	750.	884.	932.	1064.	1103.	913.	855.	704.	735.	876.
Sc	10.53	12.01	11.70	9.30	9.83	13.08	13.98	12.55	13.15	13.42
La	176.	104.	114.	91.	97.	69.	77.	209.	128.	121.
Ce	650.	253.	296.	188.	223.	176.	121.	790.	372.	345.
Nd	177.	136.	128.	105.	106.	92.	80.	203.	150.	142.
Sm	41.5	28.3	30.5	24.8	26.7	21.1	20.8	51.0	33.8	35.3
Eu	9.66	6.91	6.98	5.81	6.04	4.76	4.99	11.79	7.76	7.84
Tb	7.04	4.96	5.65	4.07	4.67	3.58	3.68	9.10	5.55	5.89
Ho	4.2	4.1	4.3	2.8	3.2	2.7	3.0	8.0	4.4	5.6
Yb	18.0	13.7	14.4	12.3	11.9	8.9	9.6	22.6	15.3	16.3
Lu	2.45	2.02	2.01	1.62	1.65	1.27	1.32	3.14	2.14	2.31

1 No buried nodules were analyzed.
2 Four nodules of different diameter were analyzed in core DJ27.

Table 10. Concentration of total carbon (in weight percent) in sediments from DOMES Site A. Dashes indicate no analysis. $CaCO_3$ was ascertained to be negligible in these cores.

Interval (cm)	Organic Carbon (%C)					
	Core DJ11	Core DJ13	Core DJ35	Core DJ38	Core DJ53	Core DJ64
0.00 - 0.25	0.62	0.68	0.63	0.56	0.56	0.68
0.25 - 0.50	0.56	0.69	0.58	0.51	0.55	0.58
0.50 - 0.75	0.51	0.70	0.58	0.50	0.58	0.49
0.75 - 1.00	0.47	0.67	0.53	0.49	0.56	0.45
1.0 - 1.5	0.41	0.66	0.51	0.49	-	0.46
1.5 - 2.0	0.39	0.51	0.49	0.48	0.53	0.48
2.0 - 2.7	0.40	0.43	0.45	0.47	0.52	0.46
4.0 - 4.7	0.42	0.41	0.42	0.44	0.53	0.44
8.0 - 8.7	0.40	0.41	0.36	0.39	0.65	0.40
15.0 - 15.7	0.38	0.38	0.33	0.39	0.44	0.38
26.0 - 26.7	0.36	-	-	-	-	-
30.0 - 30.7	-	-	0.34	-	-	-
31.0 - 31.7	-	-	-	-	0.33	-
32.0 - 32.7	-	-	-	-	-	0.29
33.0 - 33.7	-	0.37	-	-	-	-
36.0 - 36.7	-	-	-	0.29	-	-

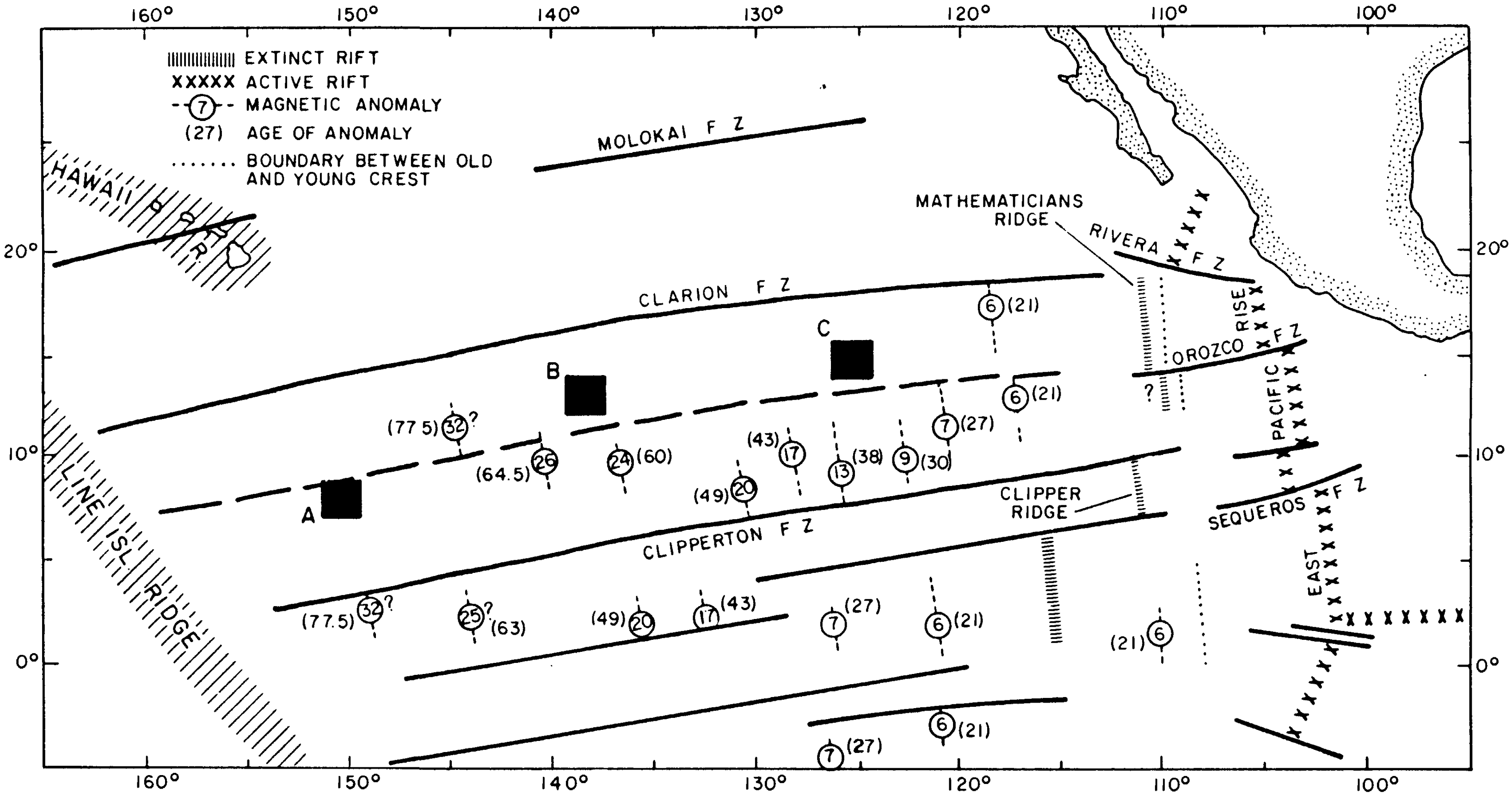

Figure 1. Location of DOMES Sites in the North Pacific, located between the Clarion and Clipperton Fracture Zones.

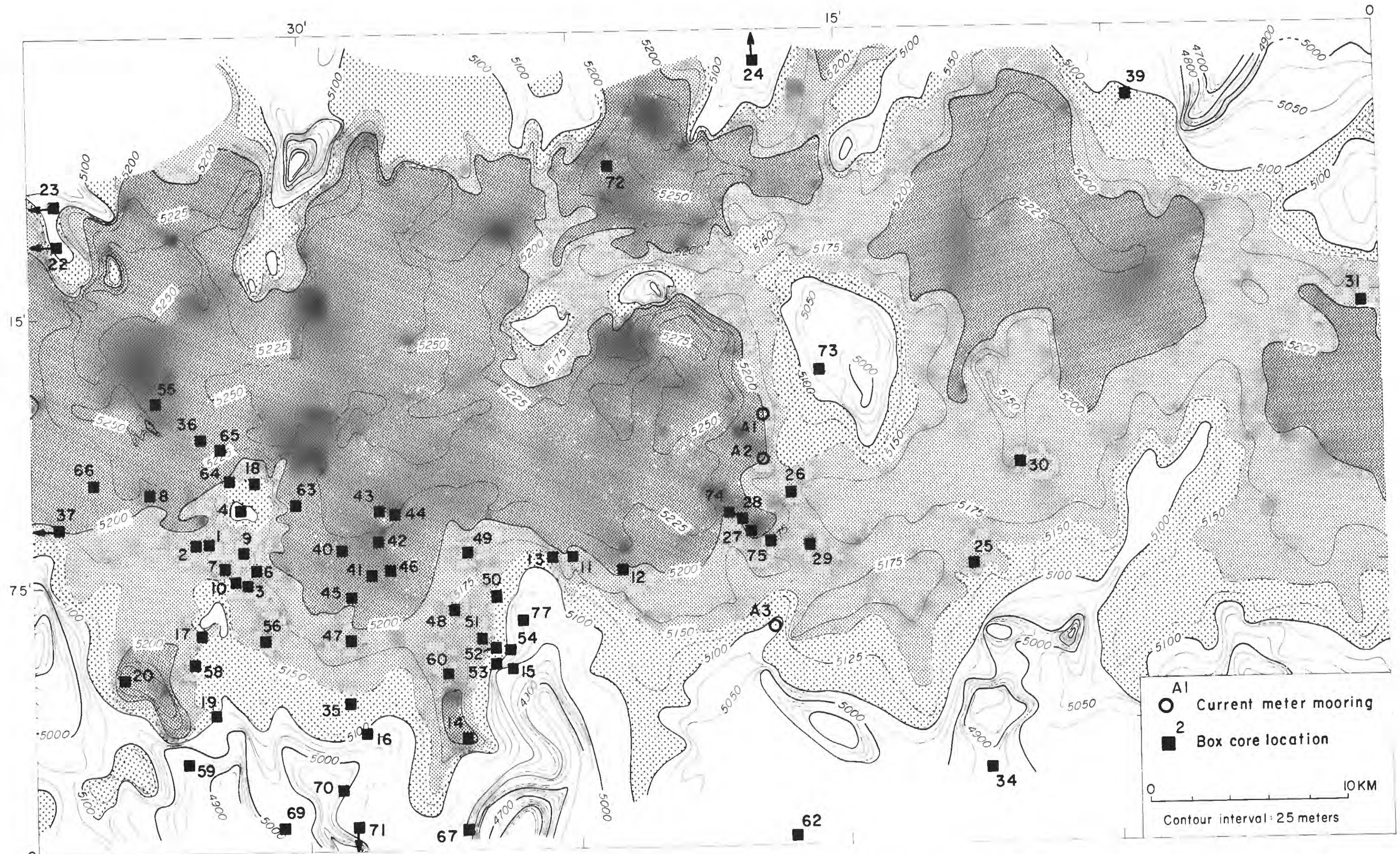

Figure 2. Bathymetry of the area within DOMES Site A between 9°15'N and 9°37.5'N and between 151°W and 151°37.5'W. Box core locations are shown to within ±250 m, approximately one half the symbol showing their position. Shading represents four different depth intervals.

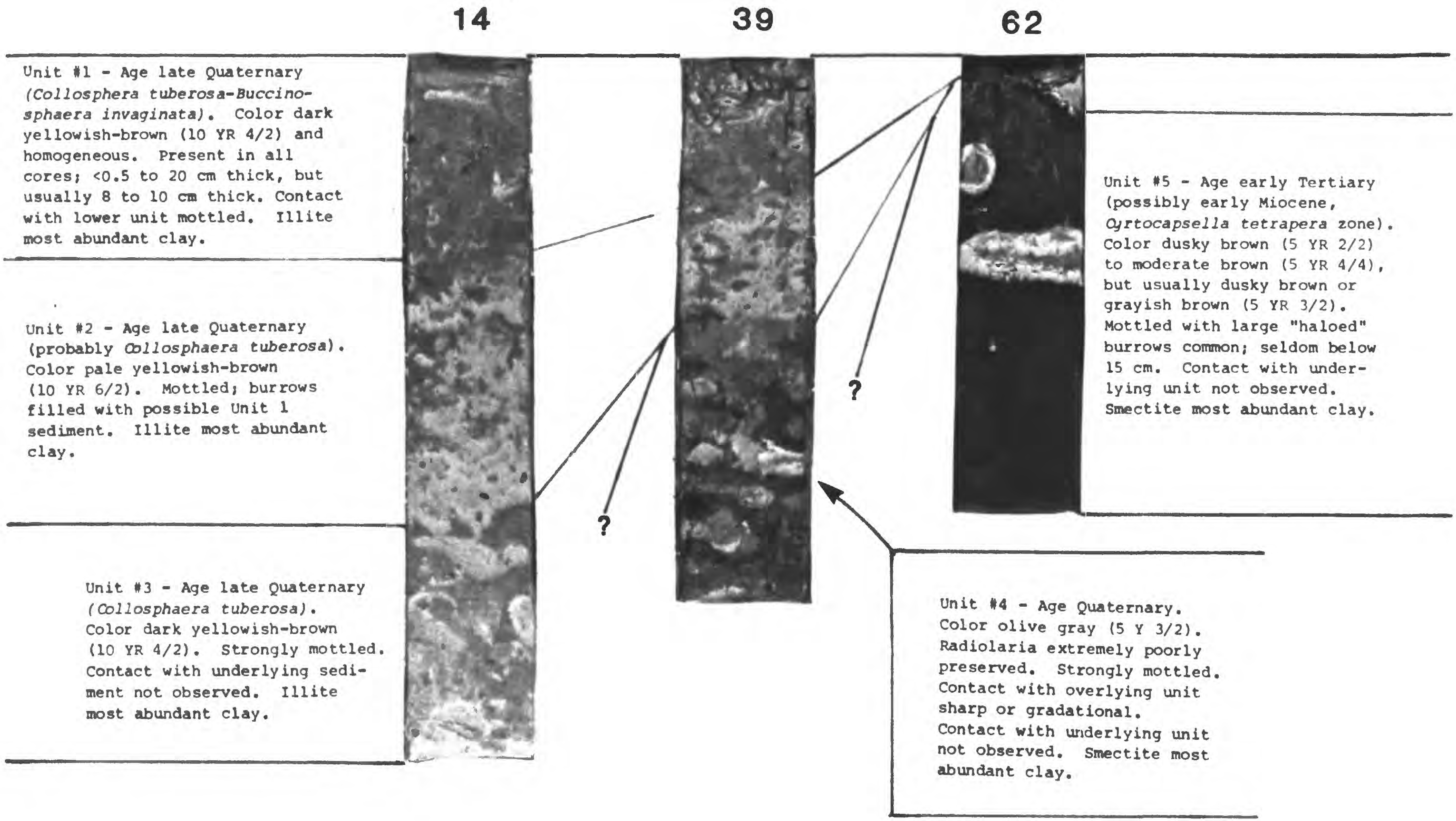

Figure 3. Lithology of the sediments recovered at DOMES Site A. Quaternary sediment typically, had a hue of 10YR (core 14) although several cores recovered sediment with a hue of 5Y. The hue of Tertiary sediment was 5YR. Ages were determined by radiolarian chronology (Piper and Blueford, 1982). Vertical scale 1:4.

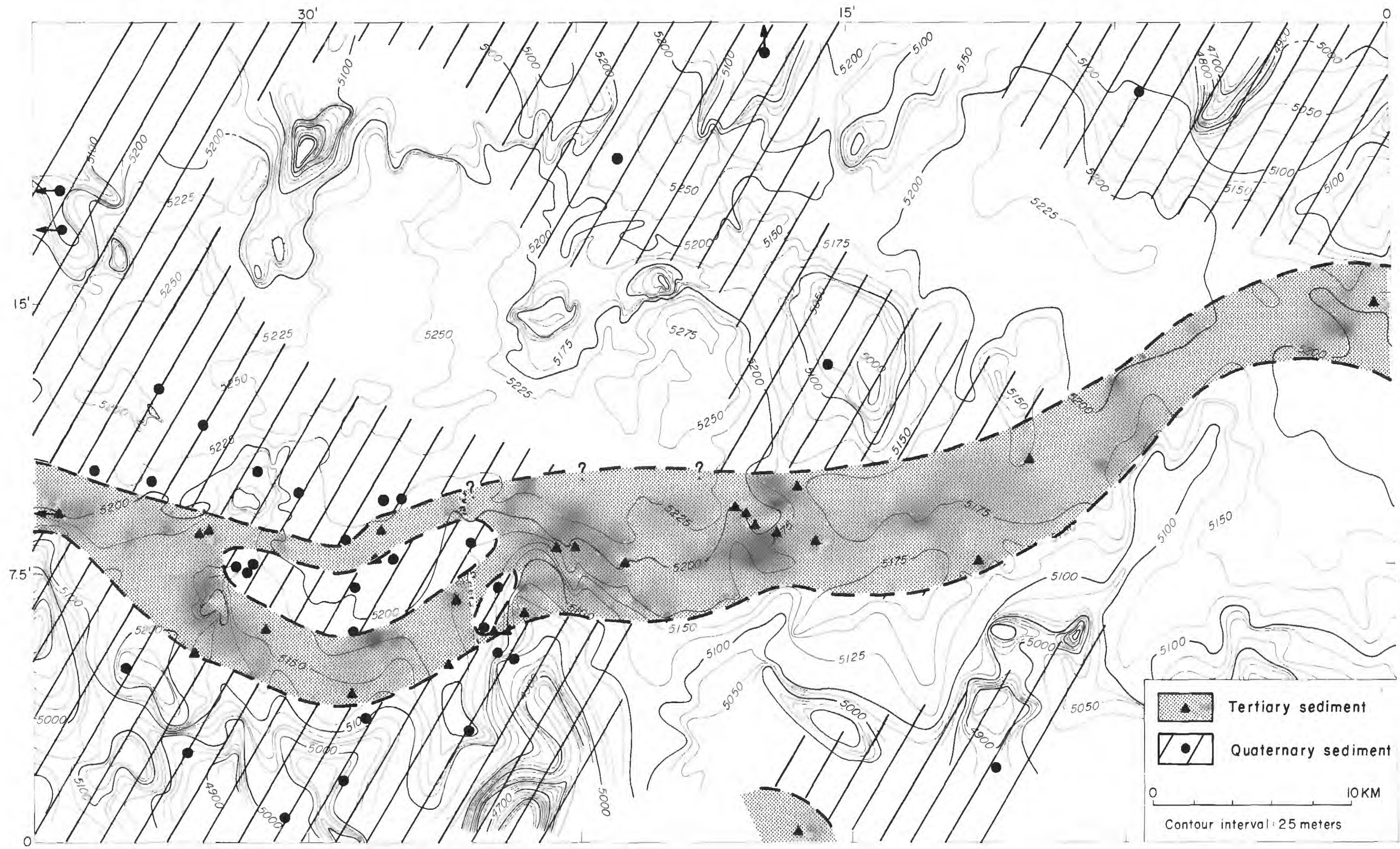

Figure 4. The location of box cores recovered at DOMES Site A. Maximum penetration for these cores was 47 cm (Table 2). All box cores recovered Quaternary sediment at the surface. Cores located along east-west trending belt also recovered Tertiary sediment at depth.

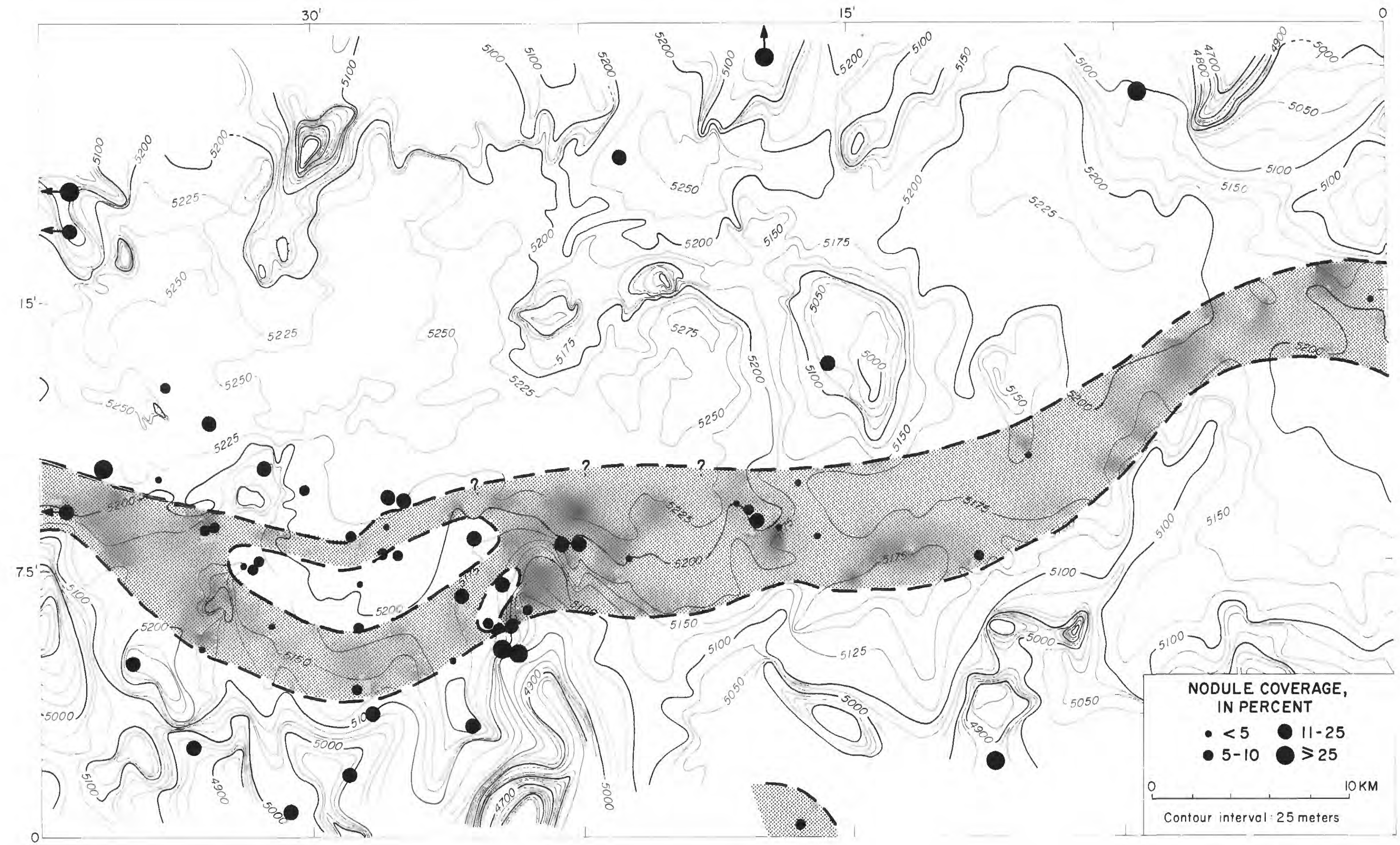

Figure 5. Nodule coverage for box cores recovered at DOMES Site A. The box core had a surface area of 0.25 m^2.