47. GEOCHEMICAL INVESTIGATIONS ON SEDIMENTS FROM THE MID-ATLANTIC RIDGE: LEG 37, DEEP SEA DRILLING PROJECT

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INTRODUCTION

Sediment samples from DSDP Leg 37 have been analyzed for a variety of elements. A particular aim of the investigation was to examine the lowermost sediments for evidence of basal metalliferous activity in the crestal area of the Mid-Atlantic Ridge, similar in nature to that previously reported on the East Pacific Rise (von der Borch and Rex, 1970; Cronan et al., 1972) and on or near the Central Indian Ocean Ridge (Cronan et al., 1974; Warner and Gieskes, 1974). A secondary objective was to evaluate possible gross compositional variations with depth in terms of changing sediment lithologies.

ANALYTICAL TECHNIQUES

All the samples were analyzed semiquantitatively by atomic absorption spectrophotometry for Ca, Fe, and Mn, after total digestion in an HNO_3-HF-$HClO_4$ mixture. Prior to analysis, the samples were air dried and ground to a fine powder. Element determinations were carried out using a Perkin-Elmer 403 AAS, and the results are presented in Table 1.

RESULTS

All the samples are very rich in calcium carbonate, the lowest values (recalculated from Ca concentrations) being around 60%.

With the possible exception of Site 333, there are no indications of increasing Fe and Mn concentrations in the sediments as basement is approached. Even at Site 333 evidence for such an increase is very limited.

It is apparent therefore that on the basis of the present data we have no real evidence in the Leg 37 sediments of metalliferous activity. However, this does not mean that such activity has not occurred, for the very high carbonate content of the sediments would make it difficult to detect. In order to evaluate this problem, it would be necessary to undertake some form of selective analysis of the sediments in order to remove the carbonate phases while leaving the remainder of the sediments as unaltered as possible.

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TABLE 1
Chemical Analyses of Deep Sea Sediments from Leg 37, Deep Sea Drilling Project

Hole	Core	Section	Sampled (cm)	Ca (%)	Al (%)	Fe (%)	Ni (ppm)	Cd (ppm)	Cu (ppm)	Co (ppm)	Mn (ppm)	Zn (ppm)	Pb (ppm)	Cr (ppm)	Ti (ppm)	Ng (%)
332A	4	4	90-92	38.2	0.47	0.22	62	12	15	50	375	22	75	62	375	0.21
332A	4	5	18-20	37.3	0.47	0.20	75	11	20	50	387	21	75	62	250	0.22
332A	5	3	116-118	38.6	0.55	0.21	62	12	16	50	475	22	62	62	250	0.24
332A	5	4	15-17	37.0	0.63	0.48	75	11	15	50	450	22	62	62	625	0.27
332A	5	5	13-15	39.7	0.66	0.21	75	12	26	62	450	28	75	62	500	0.24
332A	5	6	13-15	37.3	0.72	0.25	62	10	22	37	375	22	62	62	500	0.25
332A	6	1	61-63	38.1	0.81	0.47	75	12	17	62	500	27	62	112	625	0.27
332A	6	2	12-14	37.8	0.75	0.37	75	12	18	50	500	25	75	62	625	0.24
332B	1	1	24-26	37.9	0.58	0.27	62	12	20	50	437	25	87	75	375	0.24
332B	1	2	17-19	38.6	0.52	0.20	62	15	22	50	437	23	87	62	375	0.22
332B	1	3	18-20	37.2	0.43	0.40	75	12	20	50	337	23	100	50	250	0.24
332B	1	4	18-20	37.4	0.67	0.32	62	11	17	50	375	25	62	62	500	0.24
333	2	1	77-79	37.7	0.53	0.28	62	15	16	50	550	22	62	62	500	0.20
333	2	2	77-79	38.6	0.55	0.20	75	12	16	50	475	22	62	62	375	0.19
333	2	3	69-70	38.6	0.38	0.12	62	12	18	37	512	22	87	75	250	0.21
333	2	4	65-69	37.8	1.16	0.27	75	12	20	50	425	30	75	62	625	0.24
333	2	6	65-69	38.3	0.35	0.12	62	12	18	50	325	20	87	62	500	0.17
333	3	1	65-67	38.6	0.43	0.46	75	12	18	50	412	27	62	100	500	0.20
333	3	2	65-67	39.2	1.07	0.36	62	12	17	50	412	20	75	37	375	0.21
333	3	3	65-67	37.3	0.85	0.33	62	15	21	50	375	26	100	75	500	0.25
333	3	4	84-86	38.6	0.42	0.18	75	12	22	50	412	25	87	62	250	0.23
333	3	5	65-67	37.3	0.53	0.26	75	10	18	50	487	18	87	75	375	0.24
333	3	6	65-67	38.3	0.47	0.23	62	12	17	50	437	18	87	50	250	0.23
333	4	1	65-67	39.7	0.47	0.20	62	13	13	50	375	20	75	62	500	0.22
333	4	2	65-67	39.7	0.61	0.17	62	10	17	50	312	22	87	75	500	0.22
333	4	3	65-67	39.7	0.32	0.16	62	12	15	37	425	22	62	62	500	0.22
333	4	4	65-67	38.6	0.46	0.22	75	37	15	62	337	32	62	62	500	0.22
333	4	5	65-67	37.9	0.65	0.31	75	13	15	50	312	22	75	62	500	0.23
333	5	2	65-67	38.6	0.42	0.16	75	12	12	50	325	22	62	62	500	0.19
333	5	4	65-67	36.4	1.26	0.63	62	12	20	50	387	37	87	75	1000	0.43
333	6	1	65-67	39.2	0.47	0.21	75	12	15	50	387	22	75	50	375	0.23
333	6	2	65-67	37.0	0.98	0.47	75	15	18	50	337	27	75	50	875	0.34
333	7	2	65-67	38.8	0.91	0.47	62	10	22	62	662	27	75	75	875	0.34
333	1	1	65-67	38.5	0.45	0.22	75	11	15	50	375	22	75	62	250	0.21
334	1	1	65-67	38.6	1.10	0.61	62	12	30	50	712	30	225	62	750	0.28
334	1	2	65-67	36.8	1.05	0.58	75	12	32	50	725	27	62	62	875	0.30
334	2	1	65-67	38.3	0.40	0.21	75	12	12	50	200	22	87	62	250	0.19
334	2	2	65-67	37.8	0.68	0.36	75	13	15	62	237	25	100	62	875	0.21
334	2	3	65-67	38.1	0.81	0.45	75	11	126	50	225	30	75	62	1250	0.27
334	2	4	65-67	36.9	0.82	0.43	62	12	22	50	250	13	62	62	1000	0.25
334	2	5	65-67	37.6	0.77	0.37	75	13	18	62	237	21	62	62	1000	0.24
334	2	6	65-67	37.9	0.51	0.32	75	12	11	50	275	21	75	62	500	0.21
334	3	2	65-67	36.7	0.90	1.00	75	12	37	50	312	45	75	62	1000	0.36
334	4	1	65-67	34.2	1.26	1.17	62	11	20	50	387	31	87	75	2375	0.46
334	5	3	65-67	33.4	2.50	1.75	62	11	21	50	475	41	62	75	3125	0.68
334	5	4	65-67	25.7	5.66	3.99	62	11	40	62	762	61	62	100	7728	1.41
334	6	1	65-67	25.8	6.18	3.73	62	11	32	50	800	62	62	75	7728	1.23
334	6	2	65-67	30.7	3,22	2.07	62	11	25	50	700	43	75	75	3750	0.79
334	7	1	65-67	30.2	3.34	2.26	75	11	25	50	712	52	75	75	3750	0.81
334	7	2	100-102	31.1	2.96	2.30	62	11	22	50	687	46	62	62	3750	0.67
334	7	3	24-26	30.9	2.96	1.96	75	11	25	50	675	42	87	75	3375	0.65
334	7	4	65-67	30.9	3.22	2.25	75	11	21	50	750	40	75	75	3625	0.72
334	7	5	65-67	29.8	3.34	2.23	75	7	26	50	725	43	62	75	3750	0.75
334	7	6	65-67	29.7	3.34	2.18	62	11	27	50	725	45	75	75	6440	0.79
334	8	1	115-117	26.1	3.22	3.34	62	10	22	50	750	61	50	87	6440	0.104
334	8	2	49-49	26.1	5.02	3.47	62	10	30	50	700	60	75	75	6440	1.15
334	9	2	111-113	33.3	2.02	1.45	62	15	22	50	600	36	100	62	3125	0.51
334	9	3	65-67	32.8	2.30	1.50	75	13	25	50	600	36	75	62	3000	0.56
334	9	4	60-62	33.3	2.16	1.50	62	12	20	50	600	37	75	62	3000	0.55
334	11	2	64-66	36.7	0.96	0.57	62	12	15	50	425	27	62	62	1250	0.30
334	11	3	65-67	36.0	0.88	0.75	75	13	13	50	512	26	75	50	1000	0.30
334	11	4	65-67	37.8	0.77	0.52	62	10	15	50	625	22	75	62	1000	0.27
334	12	2	65-67	35.8	1.01	0.68	75	12	15	50	512	30	62	62	1125	0.32
334	12	3	65-67	36.3	1.25	0.87	62	12	17	50	575	30	75	62	1625	0.39
334	12	4	65-67	36.9	1.27	0.90	75	11	20	50	650	30	75	75	1250	0.40
334	13	2	108-110	36.7	1.12	0.78	62	12	18	50	700	27	62	75	1500	0.36
334	13	5	65-67	35.8	1.13	0.83	62	11	13	50	575	26	62	62	1250	0.37
334	13	6	65-67	36.9	1.05	0.72	75	12	13	50	575	30	62	62	1125	0.36
334	14	1	88-90	36.8	0.98	0.75	75	11	17	50	762	27	87	75	1000	0.36
335	1	2	65-67	35.4	2.15	0.56	75	12	25	50	237	26	62	75	750	0.35
335	1	3	65-67	38.3	0.91	0.32	75	12	16	50	212	24	75	50	500	0.23
335	1	4	65-67	37.4	1.05	0.32	75	10	14	50	462	27	75	62	500	0.24
335	2	2	65-67	38.7	0.50	0.16	75	12	12	50	612	21	87	50	250	0.18
335	2	3	65-67	39.6	0.51	0.16	62	15	18	50	550	25	75	50	250	0.19
335	2	4	65-67	39.7	0.38	0.16	75	12	12	50	300	20	75	62	500	0.17
335	2	5	65-67	39.2	0.35	0.13	75	12	16	50	300	20	100	75	375	0.17
335	3	1	65-67	38,8	0.43	0.17	62	14	15	50	350	20	75	62	375	0.18
335	4	2	65-67	39.5	0.32	0.12	62	12	12	50	237	20	75	62	250	0.17
335	4	3	65-67	38.6	0.38	9.13	62	12	15	50	275	20	75	50	387	0.18