APPENDIX II. GRAIN-SIZE AND CARBON/CARBONATE ANALYSES, LEG 61[1]

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GRAIN-SIZE ANALYSES

Sand-silt-clay distribution was determined on 10-cm^3 sediment samples collected at the time the cores were split and described. The results are listed in Table 1.

The sediment classification used here is that of Shepard (1954), with the sand, silt, and clay boundaries based on the Wentworth (1922) scale (Fig. 1). Thus, the sand, silt, and clay fractions are composed of particles whose diameters range from 2000 to 62.5 μm, 62.5 to 3.91 μm, and less than 3.91 μm, respectively. This classification is applied regardless of sediment type and origin; therefore, the sediment names used in this table may differ from those used elsewhere in this volume, e.g., a silt composed of nannofossils in this table may be called a nannofossil ooze in a site-summary chapter.

Standard sieve and pipette methods were used to determine the grain-size distribution. The sediment sample was dried and dispersed in a Calgon solution. If a sediment sample failed to disaggregate, it was treated with a sonic probe and, if necessary, hydrogen peroxide. Sediment samples which resisted this treatment were not analyzed.

The sand fraction was removed by wet sieving, using a 63-μm sieve, and the silt and clay fractions were analyzed by standard pipette analysis. Sampling depths and times were calculated using equations derived from Stokes' settling-velocity equation (Krumbein and Pettijohn, 1938, pp. 95–96):

$$\frac{D}{t} = V = \frac{2gr^2 (d_1 - d_2)}{9\eta}$$

$$t = \frac{9D\eta}{2gr^2 (d_1 - d_2)}$$

where

V = velocity, in cm/s
t = time, in sec*
D = depth pipette is inserted, in cm
g = gravity, in cm/s^2*
r = radius of individual particles, in cm*
d_1 = density of solid particles arbitrarily set at 2.675 g/cm^3
d_2 = absolute density of distilled water at different temperatures (Hodgman et al., 1960, p. 2129)
η = viscosity of distilled water in poises at different temperatures (Hodgman et al., 1960, p. 2181)

The reproducibility of the grain-size analysis has been previously tested (Boyce, 1972), and it was found that over a period of time with several operators the reproducibility for the sand–silt–clay fractions is ±2.5% (absolute). For detailed, step-by-step procedures, see Volume 4 of the *Initial Reports of the Deep Sea Drilling Project*.

CARBON AND CARBONATE ANALYSES

Leg 61 sediments were analyzed for total carbon and acid-insoluble (organic) carbon, using the new Leco WR-12 analyzer, according to the standard technique outlined below.

The 3-cm^3 sediment samples were first dried and ground into a homogeneous powder. The ground sediment was redried at 105 to 110°C, and two samples, a 0.1-g and a 0.5-g sample, were weighed into Leco clay crucibles. The 0.5-g sample was acidified with 10% hydrochloric acid and washed with distilled water. The sample was then dried and analyzed for acid-insoluble carbon. The 0.1-g sample was analyzed for total carbon without further treatment. If the sample contained less than 10% $CaCO_3$, an additional 0.5-g sample was analyzed for greater accuracy. The calcium carbonate percentages were calculated as follows: (% total C − % organic C) × 8.33 = % $CaCO_3$. Although other carbonates may be present, all acid-soluble carbon was calculated as calcium carbonate. All results are given in weight percent (Table 2).

Detailed descriptions of the technique and theory may be found in Bader, Gerard, et al. (1970) and Boyce and Bode (1972).

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[1] *Initial Reports of the Deep Sea Drilling Project*, Volume 61.
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* Five figures were used in calculations to avoid rounding off variations.

Table 1. Grain-size analyses, Leg 61.

Hole	Core	Section	Sub-bottom Depth to Top of Core (m)	Sample Depth (m)	Sand (%)	Silt (%)	Clay (%)
462	1	6	0.50	9.29	0.0	32.5	67.5
462	3	1	19.50	20.92	0.1	22.7	77.2
462	3	4	19.50	24.16	0.0	24.7	75.3
462	4	2	29.00	31.11	0.1	33.2	66.6
462	4	4	29.00	33.90	0.0	30.2	69.8
462	5	1	38.50	39.78	0.0	44.1	55.9
462	5	4	38.50	44.24	0.9	49.8	49.3
462	5	6	38.50	47.05	2.6	43.3	54.1
462	6	3	48.00	51.41	53.2	29.6	17.3
462	8	4	67.00	72.51	13.4	38.3	48.3
462	10	2	86.00	88.06	0.1	42.4	57.6
462	11	2	95.50	97.44	1.7	34.4	63.9
462	11	2	95.50	97.62	0.9	50.2	48.8
462	12	4	105.00	110.57	0.3	48.1	51.6
462	13	1	114.50	114.68	10.5	52.3	37.3
462	14	1	124.00	124.52	22.3	46.2	31.5
462	16	1	143.00	143.26	0.7	41.2	58.1
462	16	2	143.00	145.13	2.9	53.7	43.4
462	16	2	143.00	145.24	1.9	49.5	48.5
462	16	2	143.00	145.35	1.5	51.7	46.8
462	16	2	143.00	145.49	1.4	56.4	42.2
462	16	2	143.00	145.59	3.2	55.7	41.1
462	16	2	143.00	145.69	0.7	56.9	42.4
462	16	2	143.00	145.79	1.0	64.3	34.7
462	16	2	143.00	145.89	2.8	63.7	33.5
462	16	2	143.00	145.98	2.4	65.5	32.1
462	16	3	143.00	146.08	4.9	60.9	34.2
462	16	3	143.00	146.19	13.7	53.4	32.9
462	16	3	143.00	146.25	2.8	63.2	34.0
462	17	1	152.50	153.52	11.8	53.5	34.7
462	18	5	162.00	168.60	0.4	60.5	39.2
462	19	4	171.50	177.23	0.3	49.3	50.3
462	20	4	181.00	186.14	9.6	58.6	31.8
462	21	1	190.50	191.90	0.0	50.1	49.8
462	23	4	209.50	214.19	6.1	42.9	51.0
462	24	2	219.00	221.73	1.2	47.4	51.5
462	25	3	228.50	232.20	1.5	41.3	57.2
462	26	3	238.00	241.33	0.2	36.8	62.9
462	27	6	247.50	255.59	0.1	48.7	51.2
462	28	5	257.00	263.62	4.2	59.5	36.3
462	28	5	257.00	263.66	15.7	51.9	32.5
462	28	6	257.00	265.65	0.4	48.8	50.8
462	29	4	266.50	272.05	0.1	45.3	54.6
462	30	1	276.00	277.21	0.1	47.8	52.1
462	32	3	295.00	298.81	12.0	43.8	44.3
462	36	1	333.00	333.93	3.9	49.2	46.8
462	37	5	342.50	348.86	8.5	49.0	42.5
462	38	1	352.00	352.95	9.9	55.5	34.6
462	39	3	361.50	365.51	6.6	57.9	35.5
462	49	1	456.50	457.44	1.5	55.2	43.2
462	49	5	456.50	463.42	0.3	42.3	57.4
462	50	1	466.00	466.85	2.1	68.6	29.4
462	50	1	466.00	467.08	6.6	55.9	37.5
462	52	3	485.00	488.12	0.0	17.1	82.9
462	54	1	504.00	505.01	0.0	29.6	70.4
462	55	4	513.50	519.31	0.3	25.6	74.2
462	56	1	522.50	523.34	0.0	14.7	85.3
462	57	CC	531.50	535.70	0.1	32.4	67.5
462A	1	3	78.50	81.86	0.0	41.2	58.8
462A	9	2	515.50	517.60	0.0	17.1	82.8
462A	10	3	525.00	528.61	0.0	22.0	78.0

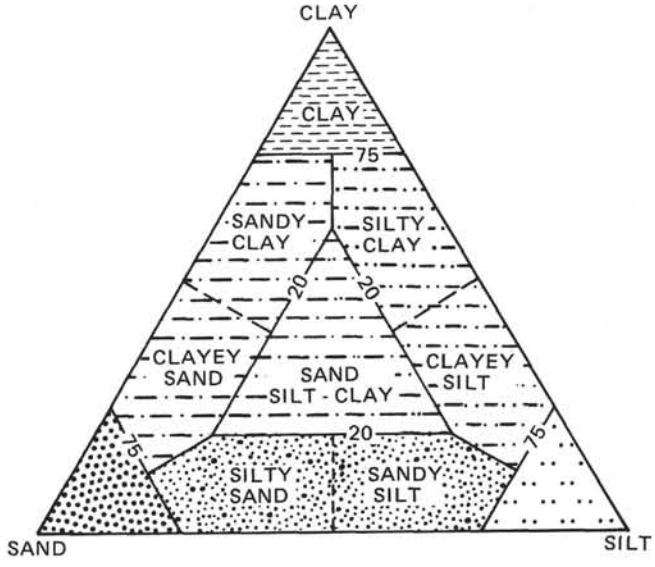

Figure 1. Sediment classification after Shepard (1954), with the sand, silt, and clay size fractions based on the Wentworth (1922) grade scale: sand, silt, and clay particles having respective diameters of 2000 to 62.5 μm, 62.5 to 3.91, and less than 3.91 μm. Shepard's (1954) sediment classification is a function of sand, silt, and clay percentages, not of composition.

Table 2. Carbon and carbonate analyses, Leg 61.

Hole	Core	Section	Sub-bottom Depth to Top of Core (m)	Sample Depth (m)	Total Carbon (wt.%)	Organic Carbon (wt.%)	$CaCO_3$ (wt.%)
462	1	6	0.50	9.33	9.5	0.0	79.0
462	3	1	19.50	20.96	0.2	0.1	0.3
462	3	4	19.50	24.19	0.1	0.1	0.0
462	4	2	29.00	31.08	0.1	0.1	0.1
462	4	4	29.00	33.90	9.2	0.1	75.9
462	5	1	38.50	39.79	0.1	0.1	0.1
462	5	4	38.50	44.27	6.8	0.1	56.1
462	5	6	38.50	47.05	4.6	0.1	37.9
462	6	3	48.00	51.41	4.6	0.1	37.4
462	7	CC	57.50	66.10	0.0	0.0	0.0
462	8	4	67.00	72.53	10.3	0.1	84.7
462	10	2	86.00	88.06	10.7	0.0	89.2
462	11	2	95.50	97.43	4.7	0.2	37.3
462	11	2	95.50	97.62	8.1	0.0	67.1
462	12	4	105.00	110.57	10.5	0.0	87.2
462	13	1	114.50	114.73	9.4	0.0	77.7
462	14	1	124.00	124.51	10.3	0.0	85.4
462	16	1	143.00	143.25	0.1	0.1	0.0
462	17	1	152.50	153.51	10.0	0.0	82.8
462	18	5	162.00	168.58	10.6	0.0	88.0
462	19	4	171.50	177.23	1.0	0.1	8.0
462	20	4	181.00	186.12	10.5	0.0	87.5
462	21	1	190.50	191.61	10.8	0.0	89.6
462	22	4	200.00	205.75	10.2	0.0	84.3
462	23	4	209.50	214.19	11.3	0.0	93.7
462	24	2	219.00	221.81	10.2	0.0	84.5
462	25	3	228.50	232.17	8.4	0.0	69.2
462	27	6	247.50	255.63	11.6	0.0	96.1
462	28	5	257.00	263.62	11.0	0.0	91.0
462	28	6	257.00	265.22	11.1	0.0	92.7
462	28	6	257.00	265.69	10.1	0.0	83.8
462	29	4	266.50	272.09	11.5	0.0	95.5
462	30	1	276.00	277.21	11.4	0.0	94.8
462	31	1	285.50	286.57	11.1	0.0	92.1
462	32	3	295.00	298.81	8.9	0.0	74.0
462	33	2	304.50	306.53	9.4	0.0	77.9
462	36	1	333.00	333.92	9.8	0.0	81.7
462	36	2	333.00	335.49	0.1	0.1	0.3
462	37	5	342.50	348.90	9.6	3.0	54.7
462	38	1	352.00	352.93	0.1	0.1	0.2
462	39	3	361.50	365.50	3.5	0.0	28.7
462	44	1	409.00	409.44	2.9	0.0	24.2
462	47	CC	437.50	437.60	11.4	0.0	94.5
462	48	1	447.00	447.72	8.2	0.0	68.0
462	49	1	456.50	457.43	2.7	0.0	21.8
462	49	5	456.50	463.42	5.0	0.0	41.4
462	50	1	466.00	466.84	1.7	0.1	13.6
462	50	1	466.00	467.12	2.0	0.0	16.4
462	52	2	485.00	487.54	1.0	0.0	7.9
462	52	3	485.00	488.16	6.6	0.1	54.4
462	53	1	494.50	495.62	6.1	0.0	50.9
462	54	1	504.00	505.05	7.8	0.0	64.9
462	55	2	513.50	516.06	2.6	0.0	21.2
462	55	4	513.50	519.29	1.7	0.0	13.9
462	56	1	522.50	523.34	0.0	0.0	0.1
462	57	CC	531.50	535.70	1.9	0.0	15.8
462	59	2	549.50	551.32	0.0	0.0	0.1
462	59	2	549.50	552.00	0.1	0.0	0.2
462	63	1	579.50	579.75	0.1	0.1	0.3
462	64	2	585.50	587.59	0.1	0.0	0.6
462A	1	3	78.50	81.83	11.2	0.0	92.7
462A	9	2	515.50	517.60	2.3	0.1	18.9
462A	10	3	525.00	528.61	0.0	0.0	0.0
462A	40	1	702.00	703.34	0.1	0.1	0.2
462A	44	3	729.00	732.93	7.0	0.0	57.8