

APPENDIX II. GRAIN SIZE ANALYSES, LEG 20

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Sand-silt-clay distribution was determined on 10-cc 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 (Figure 1). Thus the sand, silt, and clay fractions are composed of particles whose diameters range from 2000 to 62.5 microns, 62.5 to 3.91 microns, and less than 3.91 microns, 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 nanofossils in this table may be called a nanno ooze in a site 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 the above treatment were not analyzed.

The sand fraction was removed by wet sieving using a 63 micron 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, p. 95-96):

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

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

where

V = velocity in cm/s

t^1 = time in seconds

D = depth pipette is inserted, in cm

g^1 = gravity in cm/sec²

r^1 = radius of individual particles, in cm

d_1 = density of solid particles arbitrarily set at 2.675 gm/cc

d_2 = absolute density of distilled water at different temperatures (Hodsman et al., 1960, p. 2129)

η^1 = viscosity of distilled water in poises at different temperatures (Hodsman 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 $\pm 2.5\%$ (absolute). For detailed step-by-step procedures see Volume IV of the Initial Reports of the Deep Sea Drilling Project.

REFERENCES

- Boyce, R. E., 1972. Grain Size Analysis, Leg 9, Deep Sea Drilling Project. In Hays et al., Initial Reports of the Deep Sea Drilling Project, Volume IX: Washington (U. S. Government Printing Office), 779.
- Hodgman, C. D., Weast, R. C., and Selby, S. M., 1960. Handbook of Chemistry and Physics: Cleveland (Chemical Rubber Publishing Co.), 3472 p.
- Krumbein, W. C. and Pettijohn, F. J., 1938. Manual of Sedimentary Petrography: New York (Appleton-Century-Crofts, Inc.).
- Shepard, F. P., 1954. Nomenclature based on sand silt-clay ratios: J. Sediment. Petrol., v. 24, p. 151.
- Wentworth, C. K., 1922. A scale of grade and class terms for clastic sediments: J. Geol., v. 30, p. 377.

TABLE 1
Grain Size Determinations, Leg 20

Core, Section Top of Interval	Depth (cm)	Sand (%)	Silt (%)	Clay (%)	Classification
Site 194					
1-1, 114	38.6	3.0	47.0	50.0	Silty clay
1-2, 130	40.3	3.7	49.6	46.7	Clayey silt
1-2, 142	40.4	13.1	55.1	31.8	Clayey silt
1-3, 65	41.2	6.9	46.5	46.6	Silty clay
1-3, 131	41.8	7.3	54.3	38.4	Clayey silt
1-4, 36	42.4	3.2	60.4	36.4	Clayey silt
1-4, 58	42.6	7.8	55.7	36.5	Clayey silt
1-5, 8	43.6	10.8	57.3	31.9	Clayey silt
1-5, 143	44.9	5.3	53.0	41.7	Clayey silt
1-6, 40	45.4	6.5	52.0	41.5	Clayey silt
1-6, 135	46.4	3.6	52.9	43.5	Clayey silt
1-6, 139	46.4	9.1	59.2	31.8	Clayey silt
2-1, 112	143.1	4.4	41.1	54.5	Silty clay
2-1, 136	143.4	0.8	49.2	50.0	Silty clay
2-2, 120	144.7	1.5	30.6	67.9	Silty clay
2-3, 92	145.9	1.5	29.4	69.2	Silty clay
2-4, 107	147.6	2.3	28.4	69.2	Silty clay
2-5, 100	149.0	4.4	49.7	45.9	Clayey silt
Site 195					
1-1, 132	64.3	2.8	43.2	54.1	Silty clay
1-2, 34	64.8	7.7	50.6	41.6	Clayey silt
1-2, 42	64.9	4.0	45.8	50.2	Silty clay
1-3, 32	66.3	3.8	47.6	48.5	Silty clay
1-4, 73	68.2	5.3	52.6	42.1	Clayey silt
1-5, 54	69.5	6.8	50.1	43.2	Clayey silt

¹Five figures were used in calculations to avoid rounding off variations.

TABLE 1 – Continued

Core, Section Top of Interval (cm)	Depth (cm)	Sand (%)	Silt (%)	Clay (%)	Classification
2-2, 141	122.9	5.0	39.5	55.5	Silty clay
2-3, 114	124.1	4.2	38.0	57.7	Silty clay
2-4, 18	124.7	4.3	42.9	52.9	Silty clay
Site 196					
1-1, 145	39.0	0.1	25.7	74.3	Silty clay
2-1, 74	104.7	0.0	7.1	92.9	Clay
2-1, 137	105.4	0.0	11.7	88.3	Clay
2-2, 134	106.8	0.0	12.7	87.3	Clay
2-3, 64	107.6	0.0	12.4	87.6	Clay
2-4, 36	108.9	0.6	14.2	85.2	Clay
2-5, 112	111.1	0.0	16.4	83.6	Clay
2-6, 140	112.9	0.0	18.5	81.5	Clay
Hole 198A					
1-2, 136	93.4	0.0	15.6	84.4	Clay
1-3, 22	93.7	0.0	15.2	84.8	Clay
1-5, 152	98.0	0.0	10.6	89.4	Clay
1-6, 100	99.0	0.0	7.5	92.5	Clay
2-1, 88	100.9	0.0	10.3	89.7	Clay
2-2, 119	102.7	0.0	12.1	87.9	Clay
3-1, 75	110.3	0.0	9.0	91.0	Clay
3-2, 25	111.3	0.0	10.6	89.4	Clay
3-3, 25	112.8	0.0	6.4	93.6	Clay
3-4, 75	114.8	0.0	7.1	92.9	Clay
3-5, 73	116.2	0.0	8.6	91.4	Clay
3-6, 75	117.8	0.0	7.7	92.3	Clay
4-2, 75	121.3	0.0	6.1	93.8	Clay
4-4, 29	123.8	0.0	11.2	88.8	Clay
4-5, 31	125.3	19.2	20.3	60.5	Silty clay
4-5, 77	125.8	15.3	23.5	61.3	Silty clay
Site 199					
1-1, 127	58.8	0.0	43.6	56.4	Silty clay
1-2, 10	59.1	0.0	45.0	55.0	Silty clay
1-2, 83	59.8	0.7	48.5	50.8	Silty clay
1-2, 130	60.3	0.1	44.4	55.5	Silty clay
1-3, 109	61.6	0.2	47.6	52.2	Silty clay
1-4, 45	62.5	0.3	49.0	50.8	Silty clay
1-4, 125	63.3	0.0	36.0	64.0	Silty clay
2-1, 18	67.2	0.0	58.3	41.7	Clayey silt
2-2, 15	68.7	0.0	52.0	47.9	Clayey silt
2-3, 70	70.7	0.0	35.4	64.6	Silty clay
2-4, 70	72.2	0.0	48.7	51.3	Silty clay
2-5, 102	74.0	0.0	45.3	54.7	Silty clay
2-6, 68	75.2	0.0	43.1	56.9	Silty clay
2-6, 107	75.6	0.0	51.4	48.6	Clayey silt
3-1, 142	77.9	0.0	24.7	75.3	Clay
3-2, 140	79.4	0.0	37.8	62.2	Silty clay
3-3, 130	80.8	0.0	46.6	53.4	Silty clay
3-4, 115	82.2	0.0	42.7	57.3	Silty clay
3-5, 84	83.3	2.4	44.7	52.8	Silty clay
3-5, 117	83.7	1.4	58.7	40.0	Clayey silt

TABLE 1 – Continued

Core, Section Top of Interval (cm)	Depth (cm)	Sand (%)	Silt (%)	Clay (%)	Classification
4-1, 110	87.1	0.9	39.4	59.7	Silty clay
4-2, 80	88.3	0.3	48.8	50.9	Silty clay
4-3, 22	89.2	0.1	43.5	56.5	Silty clay
4-4, 103	91.5	0.0	67.3	32.7	Clayey silt
4-5, 90	92.9	0.0	45.6	54.4	Silty clay
5-1, 63	143.6	2.3	38.3	59.4	Silty clay
5-2, 97	145.5	1.9	36.9	61.2	Silty clay
5-3, 94	146.9	1.4	39.2	59.4	Silty clay
5-4, 90	148.4	2.4	35.3	62.4	Silty clay
5-6, 85	151.4	2.1	28.9	69.0	Silty clay
6-1, 105	201.1	0.0	52.5	47.5	Clayey silt
6-2, 115	202.7	0.0	51.8	48.2	Clayey silt
6-3, 132	204.3	0.0	44.2	55.8	Silty clay
6-4, 98	205.5	0.0	47.9	52.0	Silty clay
6-5, 20	206.2	0.1	53.9	46.1	Clayey silt

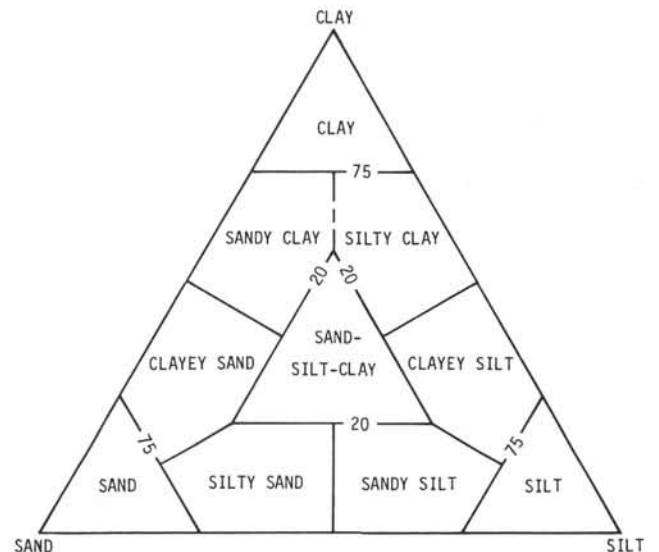


Figure 1. Sediment classification after Shepard (1954) with the sand, silt, and clay size fractions based on the Wentworth (1932) Grade Scale: Sand, silt, and clay size particles having respective diameters of 2,000 to 62.5 microns, 62.5 to 3.91 microns, and less than 3.91 microns. Shepard's (1954) sediment classification is a function of sand, silt, and clay size percentages and not composition.