10. WATER CONTENT RESULTS

Deep Sea Drilling Project East Coast Repository
Lamont-Doherty Geological Observatory, Palisades, N. Y.

METHOD

Samples of 2-cubic centimeters were taken aboard the *Glomar Challenger* from each of the cores and then frozen. These frozen samples were used for shore-based determination of water content. On subsequent legs, it is hoped that this work may be completed directly on board ship using fresh sediment. It was not done this time because the balance did not work satisfactorily at sea.

The frozen sample was weighed and then dried in an oven to a constant weight, after this it was placed in a desiccator and returned to room temperature. The dry sample was then weighed and the percentage water content by weight originally present in the sample was calculated.

RESULTS

A complete list of the water content results is given as Table 1. A plot of the percentage water content against depth below sea floor surface is given as Figure 1.

Site 1

The piston core taken at Site 1 shows a rapid decrease in water content in the sediments from 60 per cent water at the surface to 29 per cent at a depth of 10 meters. The drilled cores show that from this point on the decrease in water content is slower to a depth of about 650 meters, where the decrease becomes faster again. This is illustrated in the graph (Figure 1). Above 60 meters, the water content is usually 20 per cent or more, but below this depth it is about 15 per cent or less. The curve for water content (Figure 1) shows a close correlation with the penetrometer record for this site below a depth of 650 meters. This important change in both the water and penetrometer records at a depth of 650 meters corresponds to the transition from unconsolidated Mississippi fan laminites above, to the consolidated and massive to laminated, hemi-pelagic muds below 650 meters. Minor variations in water content occur throughout the sediments as the nature of the latter vary from silt through clayey silt to silty clay. Generally, the higher the clay proportion, the higher the water.

Site 2

Sediments at Site 2 show a rapid decrease from over 40 per cent water at a depth of 20 meters, to nearly 20 per cent at 100 meters depth. Considering that these sediments are almost entirely clays, such a rapid decrease in water content is surprising. The per cent water curve is correlated with the penetrometer values which show a consistent and rapid increase in consolidation with depth. The rapid decrease in water content and the corresponding increase in consolidation must be related to the position of this site on an actively growing salt dome, where pelagic sediments are accumulating.

Site 3

This site is similar to Site 1 and shows a rapid decrease in water content down to a depth of 40 meters after which the decrease is very gradual (Figure 1). At about 540 meters, there is an increase in the water content against the normal decreasing curve. This is probably a reflection of the sediment at this point which is a clay containing less than 20 per cent silt, in contrast to the sediments above and below which are turbidites with a higher silt content.

Site 4

Although only a few readings are available for Site 4, they seem to show a moderately rapid decrease of water content from over 40 per cent near the surface, to about 20 per cent at 190 meters. However, values for Hole 4A show a more rapid decrease in water content with depth (Table 1), and because of the few points available for this site and the somewhat anomalous results, the curve for this site in Figure 1 may be suspect. The very low water content (16.8 per cent) for the sample at 30 centimeters below the surface is because this sample contains 84 per cent sand.

Site 5

The curve for the decrease in water content with depth at Site 5 is similar to that for Site 4, although the water content decreases more rapidly in the former. The curve for Site 5 (Figure 1) is shown as a dashed line since there are so few values to be plotted and these show such wide variations. The water content of only 28.9 per cent, which is 9 centimeters below the surface, is attributed to the high silt content (46 per cent) in this silty clay. Coccolith ooze at a depth of 2.15 meters gave a value of 53 per cent water. Despite the few results available for Sites 4 and 5, the curves for decreasing water content with depth (Figure

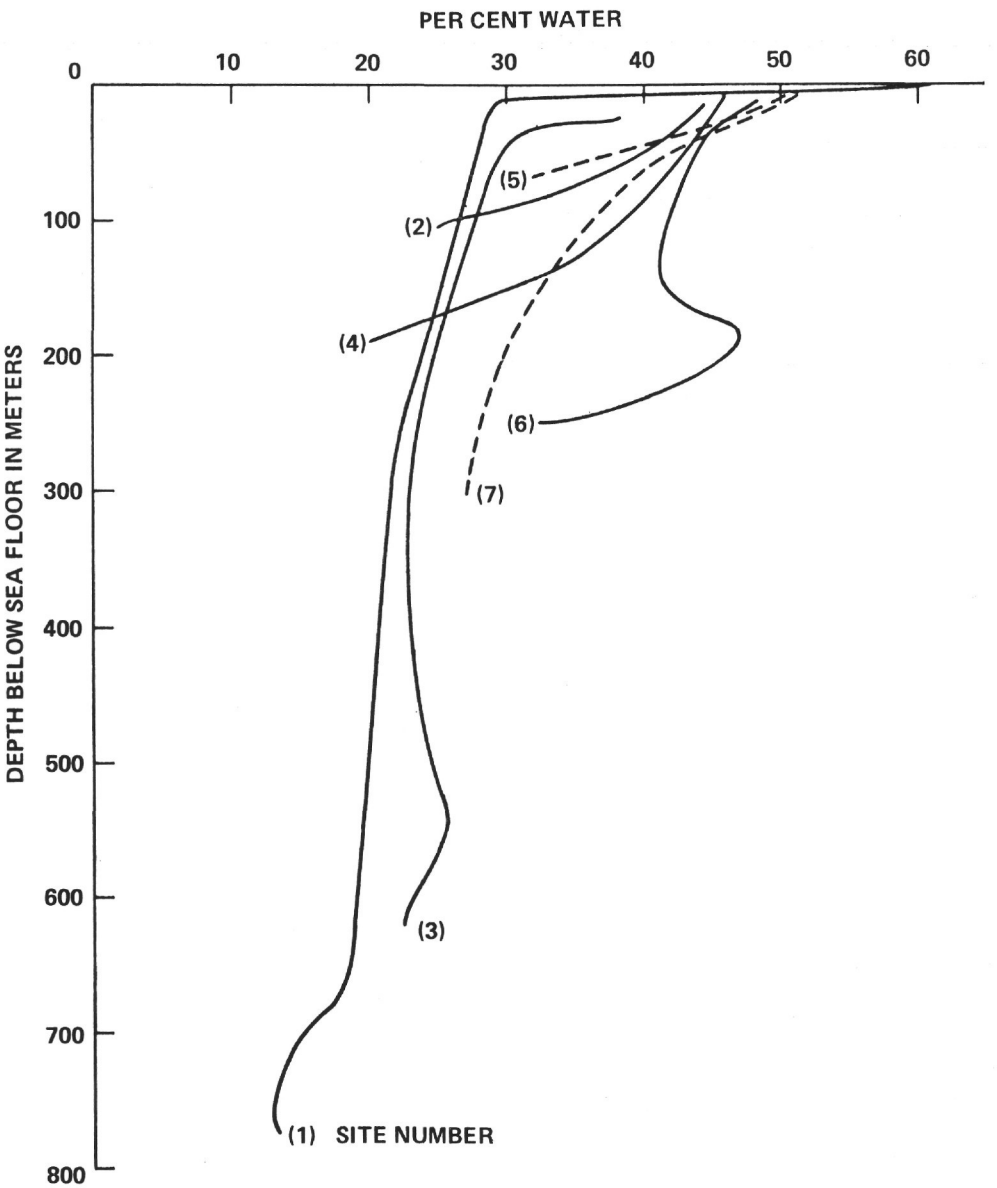

Figure 1. *Water content results from Leg 1.*

TABLE 1
Leg 1 Water Content Results

Hole	Core	Section	Sampled At (cm)	Depth Below Sea Floor (in meters)	Water Per Cent	Average Water Per Cent in Each Core
1P	1	1	18	0.18	60.6	
1P	1	1	145	1.45	47.6	
1P	1	2	145	2.95	48.8	46.6
1P	1	3	123-124	5.73	53.8	
1P	1	4	140-141	7.40	40.1	
1P	1	5	130-140	8.80	47.2	
1P	1	6	144-145	10.44	29.1	
1	1	3	6-7	156.06	23.1	25.2
1	1	6	3-4	160.53	27.3	
1	2	1	60-61	300.10	24.7	21.7
1	2	2	7.5-8.5	303.35	18.7	
1	3	1	Unknown	Unknown	19.3	19.3
1	5	1	11-12	484.11	22.7	20.1
1	5	2	3-4	487.03	17.6	
1	6	1	13-14	691.13	14.8	
1	6	2	4-5	694.04	15.4	16.1
1	6	3	7-8	695.57	18.0	
1	7	2	3-4	698.53	16.0	
1	7	3	2-3	700.07	16.4	
1	7	4	3-4	701.53	11.0	14.6
1	7	4	5-6	701.55	15.3	
1	7	6	5-6	704.55	13.3	
1	7	7	7-8	706.07	15.5	
1	8	2	19-20	755.19	15.5	
1	8	3	5-6	756.55	15.2	
1	8	4	5-6	758.05	11.6	
1	8	5	4-5	759.54	10.7	12.9
1	8	6	4-5	761.04	12.1	
1	8	7	4-5	762.54	12.6	
1	9	2	5-6	764.55	15.6	
1	9	3	5	766.05	15.1	
1	9	4	9-10	767.59	11.0	13.5
1	9	5	4-5	769.04	10.4	
1	9	5	79-80	769.79	14.3	
1	9	6	5-6	770.55	15.2	
1	9	7	6-7	772.06	13.3	

TABLE 1 - *Continued*

Hole	Core	Section	Sampled At (cm)	Depth Below Sea Floor (in meters)	Water Per Cent	Average Water Per Cent in Each Core
2	1	2	4-5	19.74	39.1	44.1
2	1	3	7-10	21.27	49.2	
2	2	1	39-40	57.99	31.3	31.3
2	3	1	105-106	66.75	32.5	34.0
2	3	2	9-10	67.29	34.6	
2	3	3	9-10	68.79	34.8	
2	4	1	42-43	101.92	23.2	24.6
2	4	2	6-7	102.66	26.1	
3	1	1	6-7	25.06	38.5	37.6
3	1	2	9-10	26.59	36.6	
3	2	1	51-52	35.51	38.3	30.8
3	2	2	39-40	36.49	30.3	
3	2	3	8-9	37.69	23.8	
3	3	2	6-7	200.46	23.6	23.6
3	4	1	41-42	210.11	24.2	24.2
3	5	2	15	321.35	23.3	25.9
3	5	3	9-10	322.79	30.6	
3	5	4	5-6	324.25	25.1	
3	5	5	40-41	326.10	24.5	
3	6	1	46-47	330.46	27.2	22.8
3	6	2	4-5	331.14	18.4	
3	7	2	3-4	382.43	17.7	23.3
3	7	3	5-6	383.95	25.8	
3	7	4	7-8	385.47	26.5	
3	8	1	99-100	429.59	28.0	23.4
3	8	2	9-10	430.19	24.5	
3	8	3	9-10	431.69	23.0	
3	8	5	10-11	434.70	18.0	
3	8	6	12-13	436.22	23.9	
3	9	2	15-17	534.25	24.4	25.7
3	9	3	9-10	535.69	23.4	
3	9	4	6-7	537.16	34.6	
3	9	5	6-7	538.66	24.9	
3	9	6	9-10	540.19	22.6	
3	9	7	8-9	541.68	24.4	
3	10	2	6-7	609.86	21.2	21.2
3	11	1	60	620.90	22.6	22.6

TABLE 1 - *Continued*

Hole	Core	Section	Sampled At (cm)	Depth Below Sea Floor (in meters)	Water Per Cent	Average Water Per Cent in Each Core
4	1	1	39-40	0.39	16.8	
4	1	3	6-7	3.06	40.6	
4	1	4	6-7	4.56	46.0	39.1
4	1	5	20-21	6.20	45.8	
4	1	6	10-11	7.60	46.1	
4	3	1	24-25	134.04	33.8	33.8
4	4	1	17-18	190.97	20.3	20.3
4A	1	1	5-6	72.85	20.6	
4A	1	2	111	75.21	23.6	20.3
4A	1	3	10-11	75.80	15.9	
5	1	1	9-10	0.9	28.9	
5	1	2	90-91	2.15	53.0	41.9
5	1	3	3-4	7.78	44.0	
5	2	1	88-89	31.98	23.4	23.4
5	3	1	52-53	71.52	31.5	31.5
6	1	1	10-11	40.90	44.0	
6	1	2	10-11	42.40	44.3	44.5
6	1	3	7-8	43.87	45.2	
6	1	4	5-6	45.35	44.5	
6	2	1	15-16	152.25	44.4	
6	2	2	6-7	153.66	41.1	
6	2	3	7-8	155.17	43.2	41.4
6	2	4	10-11	156.70	41.2	
6	2	5	20-21	158.30	41.2	
6	2	6	10-11	159.70	37.7	
6	3	2	10-11	190.85	48.6	47.7
6	3	4	11-12	192.96	46.9	
6	4	1	9-11	229.29	51.0	
6	4	2	15-16	230.85	41.9	42.8
6	4	3	8-9	232.28	35.5	
6	5	1	10-11	246.70	38.3	34.8
6	5	2	80-81	248.05	31.3	
6	6	1	7-8	249.07	28.7	32.1
6	6	2	4-5	250.54	35.6	
6A	1	1	19-20	15.39	48.8	47.7
6A	1	2	10-11	16.80	47.6	

TABLE 1 - *Continued*

Hole	Core	Section	Sampled At (cm)	Depth Below Sea Floor (in meters)	Water Per Cent	Average Water Per Cent in Each Core
6A	1	4	20-21	19.40	48.7	47.7
6A	1	6	10-11	22.30	45.7	
7	1	1	21-22	0.21	42.8	
7	1	2	21-22	1.59	45.3	
7	1	3	9-10	2.97	52.2	48.0
7	1	4	8-9	4.46	50.4	
7	1	6	7-8	7.45	49.3	
7A	2	1	22-23	278.22	28.9	
7A	3	1	18-19	287.28	26.1	27.5
7A	3	2	5-6	288.65	32.1	

1) show a close similarity with that for Hole 2. Why this should be so is not clear, particularly when one considers the position of Hole 2 on top of a dome.

Site 6

At this site there is a relatively slow rate of decrease of water content from 44 per cent at a depth of 40 meters, to 32 per cent at a depth of 250 meters. It should be noted that compared with all the other sites, Site 6 has an anomalously high water content. From 40 to 250 meters depth, all of the other sites generally contain at least 10 per cent less water than at Site 6. One of the reasons for the high water content may be the predominance of clays at this site. One sample of a pebbly mud consisted of normally compacted clay clasts in a very watery coccolith-diatom ooze with a water content of 51 per cent. The presence of these watery mudstones causes the anomalous bulge of the graph (Figure 1) at about 190 meters depth at this site. There is a distinct possibility that the feature is an artifact of drilling, and that the clasts are cavings in an artificially watered matrix. The penetrometer graph does not illustrate this feature as the measurements were made on the more normally consolidated clay clasts in the pebbly mudstone.

Site 7

Hole 7 together with Hole 7A has only two points at which the water content can be plotted on the graph (Figure 1) and, therefore, the curve between these points is hypothetical and consequently dashed. Water here varies from nearly 50 per cent at the surface to about 30 per cent at a depth of 280 meters. Generally, the water content is fairly high which may be due to the predominance of clay in the sediment.