15. CARBON CARBONATE RESULTS

Tracy L. Vallier, Indiana State University, Terre Haute, Indiana

The Leg 1 cruise report described the methods used to determine the percentages of total carbon, organic carbon and calcium carbonate. These percentages are given in the table.

RESULTS

Calcium Carbonate

Several sediment types were sampled during Leg 5. Most are carbonate oozes, green muds, radiolarian oozes, "red" clays and turbidite sands. The high carbonate in the nannofossil oozes contrasts sharply with the low carbonate of the "red" clays, radiolarian oozes and turbidite sands. Green muds have high or low calcium carbonate percentages depending on the abundance of nannofossils and/or foraminifera in the samples. Percentages range from zero to 85.5 per cent. The low values occur at many of the sites; the highest values occur in samples from Site 42.

Site 32

Sediments at Hole 32 are green muds, siliceous-fossil muds, silts and "red" clays. Calcium carbonate percentages range from 0.2 to 6.2 per cent. Low values occur in the green muds and silts of the top core and in the "red" clays near the bottom of the hole. Higher percentages are in the siliceous-fossil muds, most of which contain calcareous nannofossils. The high percentages occur in Cores 4, 6 and 7. Lowest values are in Cores 1, 8, 10, 11 and 12.

Site 33

Calcium carbonate percentages at Hole 33 range from zero to 32.5. Most sediment types are green muds, and the calcium carbonate content varies with the amounts of foraminifera and calcareous nannofossils. The high values in Cores 10 and 11 were from mud nannofossil oozes. Low values occur in Cores 1, 2, 3, 4, 8, 9 and 12.

Site 34

Calcareous nannofossils are the main determinate for percentages of calcium carbonate in cores of Hole 34. Here, percentages range from zero to 42.9. The average value for 37 samples is 9.5 per cent, which is high for sediments that are collected relatively close to the continent. The highest percentage occurs in the Upper Pliocene sediments of Core 3. Low values are in the green muds of Cores 1, 2, 5, 6, 9 and 12.

Site 35

Although the percentages of calcium carbonate for samples from this hole are quite low, they are uniform. Values range from 0.1 to 8.7 per cent, and the average value for 19 samples is 4.6 per cent. Major contributors to the calcium carbonate content are foraminifera and irregular carbonate fragments of unknown origin. The highest value is in Core 6, and the lowest value occurs in Core 16.

Site 36

Drilling revealed a variety of sediments at Hole 36. Foraminiferal-nannofossil oozes, nannofossil oozes, green muds and "red" clays are the dominant sediment types. Values of calcium carbonate range from zero to 76.7 per cent. The highest percentages, particularly those from Cores 5, 6 and 7, occur in relatively pure foraminiferal-nannofossil ooze. Lowest values are in green muds and red clays. The average percentage for 56 samples is 23.7.

Site 37

With the exception of one sample, the dominant lithology for Hole 37 is "red" clay. Values of calcium carbonate range from 0.1 to 9.2 per cent. The highest value is in a sample which contains abundant calcareous nannofossils. Lowest values are in Cores 3 and 4. The average for 19 samples is 1.4 per cent.

Site 38

The seventeen samples from Hole 38 have calcium carbonate percentages which range from zero to 54.8. Low values are in the "red" clays of Cores 2, 3, 4 and 5; high values are in nannofossil oozes of Core 6 near the bottom of the hole.

Site 39

Calcium carbonate percentages from Hole 39 are very low-ranging from zero to 0.1 per cent. The only lithology is "red" clay. The average value of 9 samples is 0.5 per cent.

Site 40

Red clays and radiloarian oozes are the dominant lithologies of Hole 40. Calcium carbonate percentages are very low, ranging from zero to 0.7. The average percentage for the 19 samples here is 0.3 per cent.

Site 41

The sediments at Hole 41 are "red" clays and radiolarian oozes. Only the "red" clays were sampled. Percentages from 10 samples range from zero to 0.4, with an average of 0.24 per cent.

Site 42

The high calcium carbonate percentages at Hole 42 reflect an abundance of calcareous nannofossils. A high of 85.5 per cent calcium carbonate contrasts greatly with the low value of 7.5 per cent. Sediment types are nannofossil oozes and radiolarian oozes with all intermixtures of those two types. Sediments with high contents of radiolarian ooze have low percentages of calcium carbonate. Those with low contents of radiolarian ooze have high contents of nannofossil ooze and a resultant high calcium carbonate percentage.

Carbon

The total carbon content of sediments from Leg 5 ranges from zero to 9.4 per cent, and the organic carbon (i.e., non-carbonate carbon) from zero to 1.4 per cent. The nannofossil oozes have high total carbon percentages, and the radiolarian oozes and "red" clays have low percentages. Highest organic carbon contents are in the siliceous-fossil muds in the near-shore Hole 32. Lowest organic carbon percentagse occur in the holes which were drilled along the 140 degree meridian (Holes 37 through 42). Total carbon percentages parallel the calcium carbonate percentages.

Site 32

Sediments from Hole 32 contain the highest percentages of organic carbon. Total carbon ranges from 0.1 to 2.0 per cent, and organic carbon percentages range from zero to 1.4 per cent. The organic carbon percentage is high in the green muds and is at the zero-level in the "red" clays. The ratio of total carbon to organic carbon is 1.4:1 in the sediments of Hole 32.

Site 33

At Site 33, the total carbon percentages range from 0.1 to 4.1, and organic carbon ranges from 0.2 to 1.1 per cent. The high organic carbon content is in Core 11 near the bottom of the hole. The ratio of total carbon to organic carbon is 2.6:1.

Site 34

Total carbon content in sediments of Hole 34 ranges from 0.4 to 5.5 per cent, and the organic carbon percentages range from zero to 0.8 per cent. Average values for this hole are 1.6 per cent for total carbon and 0.45 per cent for organic carbon. The ratio of total carbon to organic carbon is 3.5:1.

Site 35

The percentages of total carbon and organic carbon at Hole 35 are low. Organic carbon ranges from 0.1 to 0.5 per cent, and total carbon percentages range from 0.3 to 1.3. The ratio of total carbon to organic carbon is 2.7:1.

Site 36

Hole 36 has a range in total carbon percentages of 0.2 to 9.4. Organic carbon, in contrast, has a range of zero to 0.6 per cent. The ratio of total carbon to organic carbon is 10:1. This high ratio reflects the greater amount of calcium carbonate in this hole.

Site 37

The "red" clays at Hole 37 have low total carbon and organic carbon contents. Total carbon ranges from 0.1 to 1.2 per cent, and organic carbon percentages range from zero to 0.2. The ratio of total carbon to organic carbon is low, about 2.3:1.

Site 38

The nannofossil ooze near the bottom of Hole 38 has a high total carbon percentage, but the overlying "red" clays have low percentages. The total carbon and organic carbon percentages in the "red" clays of Cores 2, 3, 4 and 5 are about the same, averaging 0.1.

Site 39

The "red" clays in Hole 39 have low carbon percentages. Total carbon ranges from 0.1 to 0.2 per cent, and organic carbon percentages are from zero to 0.1.

Site 40

Both "red" clays and radiolarian oozes have low carbon contents in Hole 40. In no sample did either carbon percentage exceed 0.2. It is not possible to distinguish "red" clays from radiolarian oozes here on the basis of carbon content.

Site 41

The "red" clays in Hole 41 have low carbon contents. Percentages of both total carbon and organic carbon range from 0.1 to 0.2 per cent. The underlying radiolarian oozes were not sampled for carbon content.

Site 42

Total carbon percentages are high in Hole 42, which reflects the abundance of nannofossil oozes. Organic carbon content is low, ranging from 0.1 to 0.2 per cent. The ratio of total carbon to organic carbon here is the highest of all holes. Calculations of percentages from samples of Cores 1, 2 and 4 give a ratio of total carbon to organic carbon of about 60:1.

Carbon-Carbonate Results for Leg 5 Samples

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
32	1	1	40.0	0.8	0.8	0.2
32	1	2	22.5	0.4	0.3	0.6
32	1	3	10.0	0.4	0.4	0.6
32	1	4	20.0	0.5	0.4	0.9
32	1	5	54.0	0.5	0.3	1.1
32	1	6	40.0	0.5	0.4	0.8
32	4	2	29.0	1.5	1.0	4.6
32	4	3	10.0	1.6	1.1	4.6
32	4	4	46.0	1.0	1.0	0.7
32	6	3	23.0	2.0	1.3	6.2
32	6	6	10.0	1.7	1.4	2.6
32	7	1	120.0	1.3	0.8	4.1
32	8	1	20.0	0.2	0.1	0.7
32	10	2	120.0	0.1	0.0	0.4
32	10	3	9.0	0.1	0.0	0.3
32	11	1	111.0	0.1	0.0	0.6
32	11	2	142.0	0.1	0.0	0.4
32	12	4	30.0	0.1	0.0	0.5
33	1	1	16.0	0.5	0.4	1.4
33	1	2	16.0	0.7	0.5	1.9
33	1	6	30.0	0.6	0.4	1.2
33	2	3	15.0	1.6	0.5	8.8
33	2	4	51.0	0.7	0.4	1.9
33	2	5	20.0	0.7	0.5	1.9
33	2	6	12.0	0.6	0.4	1.0
33	3	1	70.0	0.5	0.4	1.2
33	3	2	9.0	0.6	0.4	1.9
33	3	3	58.0	0.7	0.5	1.2
33	3	4	9.0	0.6	0.4	1.0
33	3	5	80.0	1.3	0.5	6.8
33	3	6	49.0	2.3	0.6	14.6
33	4	1	29.0	0.6	0.3	2.8
33	4	3	20.0	0.8	0.4	2.6
33	4	5	20.0	0.4	0.4	0.0
33	5	3	37.0	0.7	0.3	3.3
33	5	6	49.0	2.6	0.5	17.1
33	6	6	99.0	3.2	0.3	24.2
33	8	1	34.0	1.0	0.4	5.6

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
33	8	2	47.0	1.1	0.4	6.0
33	8	3	9.0	0.5	0.4	0.8
33	8	4	20.0	1.2	0.3	7.6
33	8	5	40.0	0.9	0.5	3.7
33	9	1	48.0	0.5	0.6	0.0
33	9	3	100.0	0.1	0.2	0.0
33	10	5	100.0	2.4	0.4	17.2
33	11	2	115.0	4.1	0.2	32.5
33	11	3	101.0	1.6	1.1	4.7
33	12	6	13.0	0.4	0.3	0.7
34	1	4	6.0	0.6	0.5	0.8
34	2	1	20.0	0.7	0.5	1.4
34	2	4	145.0	0.8	0.5	2.1
34	2	5	60.0	1.0	0.6	3.6
34	2	6	20.0	1.0	0.6	3.6
34	3	1	90.0	5.5	0.3	42.9
34	3	2	130.0	4.7	0.4	36.0
34	3	3	120.0	4.9	0.4	37.5
34	3	4	130.0	2.7	0.6	17.4
34	3	5	120.0	3.8	0.4	28.3
34	3	6	100.0	2.3	0.4	15.3
34	4	1	80.0	0.7	0.5	2.1
34	4	6	40.0	2.0	0.5	11.9
34	5	2	100.0	0.6	0.5	0.9
34	5	3	110.0	0.9	0.5	2.9
34	5	4	70.0	0.6	0.8	0.0
34	5	5	105.0	0.6	0.6	0.7
34	5	6	106.0	0.7	0.4	2.3
34	6	1	99.0	1.0	0.8	1.5
34	6	1	45.0	0.5	0.4	1.1
34	7	3	130.0	1.8	0.5	10.5
34	7	6	51.0	0.8	0.6	2.3
34	8	1	34.0	1.8	0.4	11.2
34	8	2	25.0	1.8	0.4	11.3
34	8	4	12.0	1.4	0.4	8.3
34	8	5	0.0	3.2	0.4	23.7
34	8	6	130.0	0.7	0.6	1.4
34	9	2	89.0	1.2	0.4	6.9

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
34	9	5	100.0	0.6	0.6	0.6
34	9	6	10.0	1.1	0.6	3.9
34	10	2	55.0	0.9	0.3	4.7
34	10	3	30.0	2.2	0.2	16.7
34	10	5	20.0	2.2	0.4	14.9
34	10	6	80.0	1.1	0.3	6.3
34	11	2	135.0	1.3	0.2	8.9
34	11	3	40.0	0.4	0.1	2.6
34	14	2	64.0	0.6	0.0	4.8
35	2	1	70.0	0.7	0.4	3.1
35	2	2	59.0	1.0	0.5	4.5
35	2	3	81.0	0.6	0.5	0.7
35	2	4	79.0	1.0	0.2	6.4
35	2	5	69.0	1.0	0.3	5.2
35	2	6	69.0	0.9	0.3	4.6
35	6	2	70.0	1.3	0.3	8.0
35	6	4	70.0	0.9	0.3	5.4
35	6	5	70.0	1.2	0.1	8.7
35	6	6	70.0	1.3	0.4	7.6
35	7	3	60.0	0.8	0.4	2.8
35	7	4	26.0	1.1	0.5	4.3
35	9	1	120.0	1.2	0.4	6.5
35	9	2	68.0	1.2	0.4	6.7
35	9	3	70.0	1.2	0.4	6.3
35	12	6	90.0	1.0	0.4	4.8
35	13	4	100.0	0.6	0.3	2.0
35	14	4	70.0	0.4	0.3	0.5
35	15	4	70.0	0.3	0.3	0.1
36	1	1	130.0	1.0	0.4	4.5
36	1	2	80.0	0.8	0.4	3.4
36	1	3	30.0	2.9	0.3	21.4
36	1	4	80.0	0.5	0.4	0.7
36	1	5	52.0	4.5	0.4	33.8
36	1	6	85.0	5.6	0.4	43.3
36	2	1	70.0	5.4	0.4	42.2
36	2	2	70.0	0.3	0.4	0.0
36	2	3	27.0	2.0	0.5	12.3
36	2	4	130.0	2.6	0.3	19.2

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
36	2	5	30.0	4.8	0.5	36.1
36	2	6	30.0	0.8	0.6	2.1
36	3	1	49.0	5.0	0.3	39.2
36	3	3	30.0	3.0	0.4	21.4
36	3	4	40.0	0.9	0.4	4.1
36	3	5	30.0	3.1	0.4	22.5
36	3	6	30.0	3.0	0.3	22.8
36	4	1	70.0	3.4	0.2	26.8
36	4	2	10.0	3.6	0.3	27.8
36	4	3	55.0	3.3	0.0	27.4
36	4	4	70.0	3.3	0.2	26.2
36	4	5	70.0	3.5	0.3	26.3
36	4	6	39.0	4.4	0.3	33.9
36	5	3	70.0	5.9	0.3	46.4
36	5	4	50.0	5.1	0.3	39.8
36	5	6	70.0	5.6	0.2	44.8
36	6	2	60.0	6.6	0.0	54.9
36	6	4	70.0	7.4	0.0	61.8
36	6	6	20.0	6.8	0.3	54.6
36	7	1	70.0	9.4	0.2	76.7
36	8	1	80.0	1.6	0.4	9.9
36	8	2	100.0	4.7	0.3	37.2
36	8	3	36.0	2.5	0.4	17.6
36	8	4	70.0	3.8	0.4	27.9
36	8	5	75.0	2.5	0.4	17.3
36	9	2	70.0	2.0	0.4	13.2
36	9	3	70.0	1.0	0.5	4.2
36	10	1	25.0	0.7	0.2	3.8
36	10	2	20.0	1.5	0.4	9.9
36	10	4	40.0	4.2	0.3	31.8
36	10	5	80.0	4.1	0.3	32.3
36	10	6	70.0	2.2	0.4	14.7
36	11	2	70.0	1.0	0.4	5.0
36	11	3	70.0	1.0	0.4	4.9
36	11	4	70.0	1.2	0.3	6.8
36	11	5	70.0	1.3	0.4	7.9
36	11	6	70.0	2.4	0.3	17.3
36	12	1	71.0	2.7	0.2	20.2

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
36	12	2	70.0	2.9	0.0	24.2
36	12	3	70.0	3.1	0.4	22.7
36	12	4	70.0	1.9	0.4	12.9
36	12	5	70.0	4.2	0.3	32.3
36	12	6	95.0	4.6	0.4	35.0
36	13	2	70.0	0.2	0.1	0.9
36	13	3	46.0	0.2	0.1	0.0
36	13	4	70.0	0.4	0.1	2.5
37	1	2	70.0	0.2	0.1	0.7
37	1	3	70.0	0.5	0.2	2.9
37	1	4	20.0	1.2	0.1	9.2
37	2	1	71.0	0.9	0.2	5.7
37	2	2	56.0	0.2	0.2	0.7
37	2	3	21.0	0.1	0.0	1.2
37	2	4	50.0	0.2	0.1	0.6
37	2	5	70.0	0.2	0.1	0.6
37	2	6	50.0	0.1	0.1	0.1
37	3	1	70.0	0.1	0.1	0.3
37	3	2	70.0	0.1	0.1	0.2
37	3	3	40.0	0.2	0.1	0.6
37	3	4	10.0	0.1	0.1	0.4
37	3	5	10.0	0.1	0.1	0.4
37	3	6	30.0	0.1	0.1	0.5
37	4	2	7.0	0.1	0.1	0.6
37	4	3	2.0	0.1	0.1	0.6
37	4	4	40.0	0.1	0.1	0.5
37	4	5	40.0	0.2	0.1	0.9
38	2	2	55.0	0.1	0.1	0.1
38	2	4	70.0	0.1	0.1	0.0
38	2	5	20.0	0.1	0.1	0.0
38	2	6	40.0	0.1	0.1	0.0
38	3	1	20.0	0.1	0.1	0.2
38	3	3	30.0	0.1	0.1	0.4
38	3	4	50.0	0.1	0.1	0.4
38	3	5	73.0	0.1	0.1	0.3
38	3	6	104.0	0.1	0.0	0.3
38	4	2	70.0	0.1	0.1	0.3
38	4	3	70.0	0.1	0.0	0.4
38	4	4	70.0	0.1	0.1	0.2

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
38	4	5	70.0	0.1	0.1	0.3
38	5	1	70.0	0.0	0.0	0.0
38	5	3	70.0	0.2	0.1	0.5
38	6	4	80.0	6.8	0.2	54.5
38	6	5	75.0	6.0	0.1	48.8
39	1	2	60.0	0.1	0.1	0.0
39	1	3	70.0	0.1	0.1	0.2
39	1	4	70.0	0.1	0.1	0.3
39	1	5	70.0	0.1	0.1	0.4
39	1	6	70.0	0.1	0.1	0.3
39	2	1	90.0	0.2	0.0	1.0
39	2	3	100.0	0.1	0.1	0.5
39	2	4	70.0	0.2	0.1	0.8
39	2	5	70.0	0.2	0.1	0.7
40	1	1	90.0	0.1	0.1	0.0
40	1	2	50.0	0.1	0.1	0.3
40	1	3	20.0	0.1	0.1	0.1
40	1	4	70.0	0.1	0.1	0.1
40	1	5	60.0	0.1	0.1	0.0
40	2	1	75.0	0.1	0.1	0.3
40	2	2	70.0	0.1	0.1	0.1
40	2	3	70.0	0.1	0.1	0.6
40	2	5	70.0	0.1	0.1	0.0
40	2	6	80.0	0.2	0.1	0.7
40	3	2	70.0	0.1	0.1	0.4
40	3	3	70.0	0.1	0.1	0.4
40	5	2	80.0	0.2	0.1	0.5
40	8	3	70.0	0.1	0.1	0.4
40	14	3	70.0	0.1	0.0	0.5
40	15	3	80.0	0.1	0.1	0.4
40	15	4	90.0	0.1	0.1	0.4
40	15	6	70.0	0.1	0.1	0.3
40	16	3	30.0	0.1	0.1	0.2
41	1	1	70.0	0.2	0.1	0.2
41	1	2	70.0	0.1	0.1	0.4
41	1	3	70.0	0.1	0.1	0.3
41	1	4	70.0	0.2	0.2	0.4
41	1	5	70.0	0.2	0.2	0.4

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
41	1	6	70.0	0.2	0.1	0.3
41	2	1	100.0	0.1	0.1	0.0
41	2	2	70.0	0.1	0.1	0.1
41	2	3	70.0	0.1	0.1	0.3
41	2	4	70.0	0.1	0.1	0.0
42	1	1	90.0	7.5	0.1	61.4
42	1	2	70.0	6.3	0.1	51.6
42	1	3	70.0	8.3	0.1	67.9
42	1	4	70.0	8.9	0.1	73.4
42	1	5	70.0	9.9	0.1	81.4
42	1	6	70.0	10.3	0.1	84.4
42	2	1	70.0	10.2	0.1	84.0
42	2	2	70.0	10.4	0.2	85.5
42	2	3	70.0	10.4	0.2	84.9
42	2	4	70.0	9.9	0.1	81.6
42	2	5	70.0	9.9	0.2	80.7
42	2	6	70.0	10.1	0.1	83.2
42	4	1	70.0	8.2	0.1	67.1
42	4	2	70.0	7.8	0.1	64.2
42	4	3	70.0	8.1	0.1	66.0
42	4	4	80.0	1.2	0.2	8.1
42	4	5	70.0	1.1	0.2	7.5
42	4	6	70.0	2.9	0.2	22.4
42	5	1	66.0	2.9	0.1	23.5
42	5	2	40.0	0.2	0.1	1.2
42	5	3	71.0	0.9	0.1	6.3
42	5	4	70.0	0.2	0.0	1.2
42	5	5	95.0	0.1	0.1	0.5
42	5	6	70.0	0.4	0.1	2.7
42	6	1	90.0	2.0	0.1	15.9
42	6	2	70.0	4.5	0.8	30.6
42	6	3	120.0	3.6	0.3	27.8
42	6	4	120.0	1.2	0.9	2.8
42	6	5	65.0	6.9	0.1	57.0
42	6	6	70.0	4.4	0.8	29.5
42	7	4	40.0	0.2	0.0	1.0
42	8	3	70.0	7.0	0.1	57.1
42	8	4	110.0	7.2	0.7	54.1

Carbon-Carbonate Results for Leg 5 Samples – *Continued*

Hole	Core	Section	Sampled at (cm)	Total Carbon Per Cent	Organic Carbon Per Cent	Carbon Carbonate Per Cent
42	8	5	70.0	5.4	0.1	44.6
42	9	1	72.0	4.4	0.0	36.7
42	9	2	70.0	4.2	0.1	34.2
42	9	3	60.0	3.4	0.1	27.4
42	9	4	70.0	1.4	0.1	11.6
42	10	1	70.0	1.8	0.0	15.2
42	10	2	70.0	3.2	0.0	26.3
42	10	3	70.0	2.8	0.1	22.8
42	10	4	70.0	4.6	0.1	38.1
42	10	6	69.0	4.9	0.1	40.2
42	11	1	145.0	4.9	0.1	39.7
42	11	2	70.0	6.1	0.6	45.6
42	11	3	66.0	2.9	0.1	23.4
42	11	5	80.0	3.6	0.4	27.0
43	1	2	70.0	0.1	0.1	0.0
43	2	2	70.0	0.1	0.1	0.0
43	2	3	70.0	0.1	0.1	0.0
43	2	4	70.0	0.1	0.1	0.0
43	2	5	70.0	0.1	0.1	0.3