22. INTERSTITIAL WATER STUDIES ON SMALL CORE SAMPLES, LEG 20[1]

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Thirteen interstitial water samples collected at four Leg 20 sites were analyzed concurrently with those collected on Leg 19. Analytical methods were the same as employed for previous samples (Volumes I and II in this series should be consulted for details). The analyses were performed with assistance from Mr. John Mahoney. The pH and water content determinations reported here were made on board the ship at the time the sediments were processed to obtain pore fluids.

Spot coring was practiced throughout this leg and recoveries of sediment were relatively low. In only one instance, Site 199, were pore water samples obtained from more than one of the intervals where cores were retrieved. Thus the samples cannot be construed as representing the entire sedimentary section. While samples from all four sites show changes in the concentration of some of the major chemical species from their levels in open ocean waters, only at Site 199 are these deviations of a magnitude to suggest reactive sediments.

Site 196 is represented by one sample from just below the 100 meter level and Site 198 by four samples obtained between 96 and 124 meters. Compositional changes are characteristic of pore waters obtained from slowly deposited unreactive sediments. The slight enrichment of K^+ and depletion of Mg^{++} observed at these depths is of the magnitude attributable to temperature-induced changes documented by Sayles et al. (1973). Slight depletions in sulfate are typical of unreactive sediments previously investigated.

At Site 199, both Ca^{++} and Mg^{++} exhibit typical behavior for a rapidly deposited open-ocean sediment. Calcium shows a steady enrichment of 1.4 to 3.6 versus ocean water, while magnesium is correspondingly depleted by 10% to 50% with depth. Potassium, close to ocean water concentration in the top two intervals, shows a moderate (25%) depletion at 204 meters. Changes observed in two near-surface samples obtained at Site 200, in the absence of supporting evidence from one or more deep samples, are insufficient to characterize the pore waters. Silica values at all sites are consistent with the lithology of the samples.

[1]Contribution Number 3154 of the Woods Hole Oceanographic Institution.

REFERENCE

Sayles, F. L., Manheim, F. T., and Waterman, L. S., in preparation. Interstitial water studies on small core samples, Leg 15. *In* Edgar, N. T., Saunders, J. B., et al., Initial Reports of the Deep Sea Drilling Project, Volume XV: Washington (U. S. Government Printing Office).

TABLE 1
Major Constituents of Pore Fluids, Values in g/kg Fluid Unless Otherwise Indicated[a]

Sample Designation	Depth (m)	Age	Description	Na^a	Na^b	K	Ca	Mg	Total Cations (meq/kg)	Cl	SO_4	Alk. (meq/kg)	$HCO_3{}^c$	Total Anions (meq/kg)	Sum[d]	Salinity[e]	H_2O (‰)[f]	pH[g]
Site 196 (30° 07.0′N, 148° 34.5′ E; water depth 6194 m; abyssal floor E of IZU-BONIN Trench)																		
2-4	108	Late Cretaceous	Brown, manganese-rich zeolitic clay interbedded with less abundant reddish brown zeolitic clay.	10.7	10.5	0.48	0.46	1.22	593	19.3	2.43	2.9	0.18	599	34.8	34.9	49	7.4
Site 198A (25° 49.5′N, 154° 35.0′E; water depth 5958 m; 200 km N of Marcus Island)																		
1-6	96	Mesozoic Cretaceous	Dark brown limonitic-zeolitic silty clay; very stiff; rich in volcanic glass; some micro nodules.	10.8	10.7	0.39	0.43	1.24	598	19.4	2.55	3.5	0.21	602	35.0	35.2	45	7.4
2-2	102	Mesozoic Cretaceous	Dark brown homogenous limonitic-zeolitic clay and silty clay; very stiff.	10.9	10.8	0.41	0.43	1.23	602	19.4	2.57	4.3	0.26	606	35.2	35.5	47	7.3
3-5	116	Cretaceous	Dark brown limonitic-zeolitic clay and silty clay; very stiff; abundant fragments of volcanic glass.	10.7	10.5	0.40	0.42	1.23	587	19.2	2.56	5.2	0.32	599	34.8	34.9	46	7.2
4-4	124	Campanian Santonian	Dark brown limonitic-zeolitic silty clay, very stiff.	10.6	10.5	0.43	0.43	1.26	593	19.3	2.43	3.9	0.24	599	34.7	34.9	42	7.2
Site 199 (13° 30.8′N, 156° 10.3′E; water depth 6100 m; NE margin of Caroline Abyssal Plain)																		
1-4	62	Early Pliocene	Dark yellow brown zeolitic clay.	10.8	10.7	0.40	0.59	1.15	601	19.4	2.59	3.2	0.20	604	35.1	35.5	62	7.5
2-6	75	Upper Miocene	Dark yellow brown zeolitic clay.	10.9	10.8	0.39	0.66	1.10	604	19.6	2.61	3.3	0.20	609	35.4	35.5	68	7.4
3-5	82	Middle Miocene	Moderate yellowish brown zeolitic clay.	10.9	10.8	0.39	0.72	1.08	603	19.5	2.60	3.6	0.22	607	35.4	35.5	70	7.4
4-5	92	Middle Miocene	Moderate yellowish brown nanno-rich clay to nanno clay.	10.8	10.8	0.38	0.82	1.03	604	19.5	2.38	4.0	0.25	604	35.2	35.5	60	7.4
5-6	150	Middle Miocene	Dark yellowish brown radiolarian ooze.	–	10.7	0.30	1.32	0.83	605	19.4	(2.56)[g]	3.3	0.20	–	35.3	35.5	71	7.0
6-4	204	Middle Miocene	Grayish blue green nanno-bearing silty ash.	10.5	10.7	0.29	1.49	0.66	602	19.3	2.34	1.2	0.07	594	34.6	34.9	56	8.2
Site 200 (12° 50.2′N, 156° 47.0′E; water depth 1479 m; seamount top on NE margin of Caroline Abyssal Plain)																		
1-6	8	Early Quaternary	Very pale orange foraminiferal ooze.	10.7	10.6	0.38	0.43	1.26	596	19.2	2.68	5.3	0.32	602	35.0	35.5	–	7.6
3-3	22	Early Pliocene	White nanno bearing foraminiferal ooze	10.9	10.8	0.38	0.45	1.28	607	19.5	2.72	4.1	0.25	611	35.5	35.8	–	7.6

[a] Sodium determined by difference between anions and cations excluding Na.
[b] Sodium determined by atomic absorption analysis.
[c] HCO_3 is calculated from total alkalinity, assuming this is entirely due to bicarbonate ion.
[d] The sum incorporates the sodium values determined by difference.
[e] Salinity of pore fluids taken from heat sealed sections of plastic pipe prior to subdivision of samples for analysis. Salinity values determined with Goldberg temperature compensated refractometer.
[f] refractometer.
pH and water content are taken from shipboard summaries.
[g] Site 199 sulfate value in ( ) represent values determined by difference between anions and cations.

TABLE 2
Silica Concentrations
(Colorimetric Determinations)

Sample Designation	Si (mg/kg [ppm])
196-2-4	14.0
198A-1-6	4.5
198A-2-2	20.0
198A-3-5	12.0
198A-4-4	17.0
199-1-4	4.9
199-2-6	5.5
199-3-5	1.8
199-4-5	6.1
199-5-6	22.0
199-6-4	3.1
200-1-6	3.4
200-3-3	2.6