



Table 1. Interstitial water composition, Leg 59.

Hole (intervals in cm)	Sub-bottom Depth (m)	pH <sup>a</sup>	Alk <sup>a</sup> (meq/l)	Cj <sup>a</sup> (10 <sup>-3</sup> )	S <sup>a</sup> (10 <sup>-3</sup> )	Ca <sup>a</sup> (mM)	Mg <sup>a</sup> (mM)	Sr (mM)	Mn (μM)	Li (μM)	K (mM)	Si (μM)	SO <sub>4</sub> (mM)	NH <sup>b</sup> (mM)
Hole 447A														
4-3, 140-150	32.5	7.53	2.66	19.7	35.9	11.7	51.9	0.084	0	26.0	9.9	240	26.0	0.05
6-5, 140-150	54.5	7.75	2.45	19.4	35.8	15.2	49.1	0.090	0	24.0	9.0	600	30.0	0.05
Hole 448														
1-2, 113-128	2.8	7.61	2.62	19.3	35.5	10.5	53.0							
6-3, 140-150	47.5	7.62	2.72	19.3	35.8	11.2	53.0							
11-4, 140-150	96.5	7.62	2.89	19.4	36.0	10.6	53.2							
16-5, 140-150	145.5	7.63	2.87	19.7	35.8	10.6	52.7							
21-3, 135-150	190	7.62	2.67	20.4	36.9	10.6	52.0							
26-2, 141-150	236	8.50	2.65	19.2	35.5	9.9	46.2							
Hole 448A														
6-1, 140-150	253.5	7.56	2.67	19.1	36.0	11.0	51.1							
Hole 449														
2-2, 140-150	3	7.42	2.60	19.0	35.2	10.4	53.0							
5-1, 140-150	30	7.79	2.93	19.2	35.5	11.2	52.0							
8-4, 140-150	63	7.58	2.70	19.6	35.7	11.6	52.0							
11-4, 140-150	91.5	7.64	2.67	19.8	35.6	11.1	52.1							
Hole 450														
1-4, 144-150	6	7.42	2.44	19.2	35.1	10.7	51.9	0.084	0.005	21.0	9.4	282	27.8	0.06
5-2, 144-150	39	7.60	2.66	19.4	35.8	12.0	51.3	0.090	0.002	20.0	10.3	380	24.9	0.06
12-2, 140-150	105.5	7.79	1.59	19.7	36.0	26.6	30.9	0.125	0.061	26.0	8.2	489	28.6	0.05
16-3, 140-150	145	7.73	1.19	19.4	35.8	36.3	19.8	0.150	0.090	31.9	7.6	572	29.9	0.05
20-1, 140-150	180	7.79	1.01	19.3	35.6	47.6	6.22	0.165	0.098	43.0	6.8	666	31.0	0.06
24-3, 140-150	221	8.28	0.59	19.5	36.2	55.9	0.15	0.185	0.079	56.8	6.6	735	—	0.06
28-3, 140-150	260	8.30	0.46	19.1	35.4	60.0	0.00	0.159	0.032	44.4	4.1	650	—	0.06
32-3, 140-150	306	8.51	0.55	19.4	35.6	63.5	0.00	0.149	0.021	45.1	3.6	818	—	0.07
32-5, 140-150	308	—	—	—	—	—	—	—	0.025	—	—	730	—	0.05
Hole 451														
2-4, 140-150	11.0	7.52	2.96	19.5	36.2	11.7	52.9	0.094	0.004	24.8	9.8	485	30.8	0.04
5-3, 140-150	38.0	7.63	3.52	19.6	36.4	12.3	51.7	0.095	0.004	24.9	11.8	631	30.2	(0.2)
14-1, 140-150	120.5	7.98	2.15	19.7	36.4	11.1	51.9	0.094	0.003	25.1	11.3	460	—	0.05
34-1, 140-150	310.5	—	—	20.1	36.7	17.2	48.5	—	—	—	—	—	—	—

<sup>a</sup> Shipboard data.

<sup>b</sup> Values of  $\leq 0.05$  mM are not considered significant.

53, 54, 448, 450, and 451) there have been major contributions of volcanic materials (tuffs, ashes) to the overall sediment composition, only Sites 53 and 450 show appreciable concentration gradients. In this chapter we shall explore on a preliminary basis the reasons this may be so.

Interstitial data for Sites 53 and 450 are presented for comparison in Figure 2. Concentration-depth profiles of dissolved calcium and magnesium at Site 450 suggest that, in addition to a possible input from the underlying basalts, reactions below a depth of 200 meters are to a large extent responsible for the input of calcium and the removal of magnesium. Below 200 meters, dissolved silica values of  $> 700$   $\mu\text{M}$  are obtained, and strontium, manganese, and lithium all show distinct maxima near 200 meters depth. We postulate that in this depth horizon, alteration reactions that presumably involve volcanic matter are taking place, leading to these concentration changes. Dissolved potassium concentrations do not appear to be affected by this type of reaction, and no extremum is observed at 200 meters. The underlying basalts probably constitute the main sink for dissolved potassium.

In comparison, the Site 53 sediments show complex concentration-depth profiles for dissolved calcium and

magnesium, with concentration extrema at about a depth of 25 meters. The zone of these extrema coincides with a maximum in dissolved silica, which reflects the presence of radiolarian oozes in these sediments. Extrema in dissolved strontium, lithium, and manganese also occur in this zone. Again we postulate that a zone of reaction is associated with these high silica activities and that reactions in this zone have only recently gained importance, thus leading to maxima and minima in the concentration-depth profiles. Reactions in the underlying basalts are clearly responsible for further decreases in magnesium and potassium and for the release of lithium and calcium. Dissolved potassium concentrations appears unaffected by the reaction zone at around 25 meters depth.

In general, we are impressed by the similarity of the profiles at Sites 53 and 450. A common denominator is the concentration of dissolved silica higher than 700  $\mu\text{M}$ . Whereas Site 450 sediments are reported to be almost barren of radiolarian silica debris, dissolved silica values are high, probably because of the relatively high concentrations of dissolved silica associated with the abundant volcanic glass and tuffs at this site. We postulate that reactions only become feasible when dissolved silica values in excess of 700  $\mu\text{M}$  are reached. This

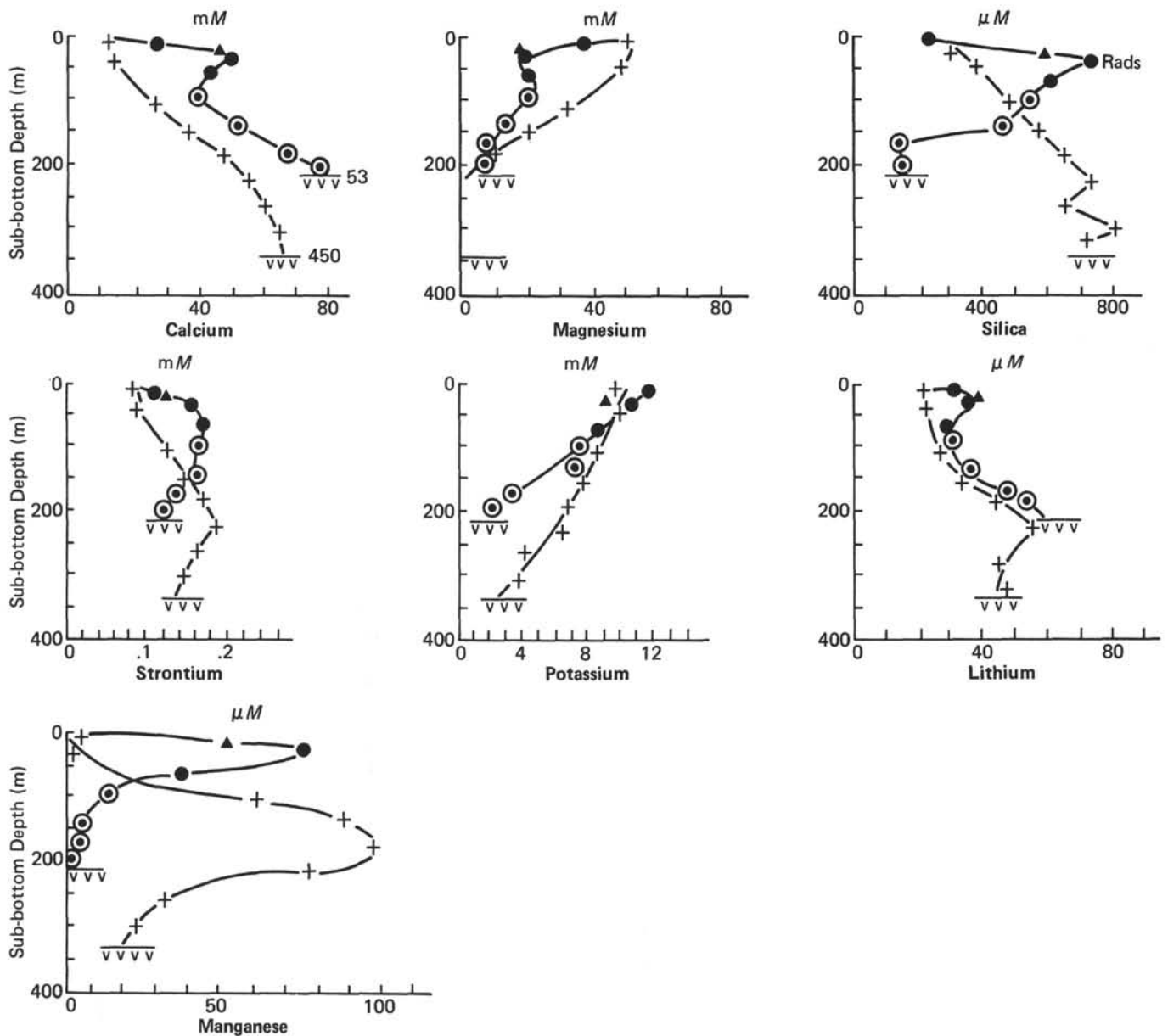


Figure 2. Interstitial water data, Sites 53 and 450 (+ = 450; ● = 53-1; ▲ = 53-2; ○ = 53-0 [Site 53, Manheim and Sayles, 1970]).

would explain the complete absence of concentration gradients at Site 54 (Manheim and Sayles, 1970) and the small gradients at Site 451 (Table 1), where dissolved silica values remain generally well below  $600 \mu\text{M}$ . Further studies on the sediments and interstitial waters (oxygen and strontium isotopes) of these sites are clearly warranted in order to unravel the processes involved.

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