

## I. MINERALOGY OF THE SEDIMENTARY SECTIONS ENCOUNTERED ON LEG 55 (SITES 430 THROUGH 433), BASED ON X-RAY DIFFRACTOMETRY

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### INTRODUCTION

On Leg 55, cores were taken from three seamounts in the Emperor seamount chain: Ōjin, Nintoku, and Suiko Seamounts. At the drilling sites the water depth was 1300 to 1700 meters; the maximum thickness of the sediment column was 180 meters at Site 433.

### METHODS

The methods used are as we have described them in the *Initial Reports of the Deep Sea Drilling Project* for Legs 51, 52, 53 (Part 2: Sites 417 and 418) (in press, pp. 721–730). The scheme of estimation is depicted in Table 1. In addition, the amounts of amorphous constituents were estimated by measuring the extent of diffuse scattering. Factors for bulk mineralogy and clay mineralogy are presented in Tables 2 and 3.

### RESULTS

The results of X-ray analyses are given in Table 4 and Figures 1 and 2. The sediments fall into two main groups: carbonate-rich (= deficient in clay) and carbonate-deficient sediments (= rich in clay). Calcite is nearly

TABLE 1  
Flow Scheme of Semiquantitative Analyses of Bulk Composition of Sediments from Leg 55

BULK SAMPLE			
Amorphous Constituents	Extent of Diffuse Scattering		
Carbonate Content	Gasometrical Determination		
Non-Clay Minerals	Peak Height × Factor (Table 2)		
Clay Minerals			
Relative Composition of Clay Minerals	Fraction <2μm Smear Slide		
	Peak Area × Factor (Table 3)		

TABLE 2  
Factors for Bulk Mineralogy

Mineral	2θ (°)	Peak	
		d (in Å)	Factor
Quartz	26.7	3.34	1.3
Feldspar	27.4–28.0	3.25–3.18	2.0
Phillipsite	12.3	7.2	4.0?
Apatite	32.2	2.78	3.0
Barite	25.9	3.44	2.0
Manganite	26.2	3.40	2.0
Pyrolusite	28.3	3.15	2.0

TABLE 3  
Factors for Clay Mineralogy

Mineral	Peak		
	2θ (°)	d (in Å)	Factor
Smectite	5.2	17.0	1
Chlorite	12.3	7.2	2
Illite	8.8	10.0	4
Kaolinite	12.3	7.2	2

always the only carbonate mineral. For the clay minerals, smectite and illite are the alternately predominant clay minerals. Certain cores have relatively high amounts of amorphous material.

The data for Sites 430, 431, and 432 are sparse. At Site 433, we have divided the section into five units:

1) In the first unit above basement, the carbonate content is 60 per cent on the average, and consists mainly of calcite with some Mn-calcite. The feldspar content varies from 3 to 20 per cent, and may indicate varying amounts of volcanic components. Small amounts of smectite are present.

2) The second unit includes calcarenites with carbonate contents between 90 and 100 per cent. Calcite is the only carbonate component.

3) Clayey calcareous mud with 30 to 40 per cent clay minerals occurs in the third unit. Illite and, in the uppermost samples of this unit, barite and apatite are present.

4) This unit is made up of a siliceous calcareous mud. The amount of calcite varies from 20 to 90 per cent, depending on the amounts of diatoms and nanofossils.

5) The uppermost unit is also made up of calcareous mud. In contrast to the Fourth unit, this unit contains larger amounts of quartz, feldspar, and chlorite. In addition, there are Mn-rich minerals such as pyrolusite, Mn-calcite, and manganite (?). High percentages of amorphous components (Fe- and Mn-oxides ?) are also present in this unit.

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TABLE 4  
X-Ray Mineralogical Analyses, Leg 55

Core-Section, Interval (cm)	Amorphous Material	Bulk Mineralogy = 100%							Carbonates	Clay Mineralogy = 100%					
		Clay Minerals	Quartz	Feldspar	Phillipsite	Apatite	Barite	Other		Calcite	Mn-Calcite	Mg-Calcite	Smectite	Chlorite	Illite
<b>Hole 430</b>															
2-4, 8-10	28 (Mn)	52	2	3p/6k		3			6	6			75	19	6
<b>Hole 430A</b>															
1-1, 87-88		10	1	1					86	86			100		
2-1, 119-121		21	2	3					74	74			100		
4-1, 136-138	27 (Volcanic glass)	60	1	8	4	?			<3				100	TR	TR
<b>Hole 431</b>															
1-1, 65-69	37 (Fe, Mn)	56	3	1		?			3	3			71	29	
2-1, 0-2	17 (Fe, Mn)	33	2	3p/2k					43	43			30	63	7
<b>Hole 431A</b>															
1-1, 128-130	32 (Fe, Mn)	58	4	3		?			3	3			57	35	8
2-2, 14-16	25 (Fe, Mn)	52	2	2	8	7		Manganite 4?	<3				100	TR	TR
<b>Hole 432</b>															
1-1, 30-32		18	2	1									44	42	
1-4, 80-82	26 (Fe, Mn)	38	2	7				Pyrolusite 2	79	79	?		92	7	TR
<b>Hole 433</b>															
1-1, 54-56		44	5	3									22	57	3
1-1, 134-136		36	7	4p/15k									29	50	9
1-2, 26-28	10 (Diatom)	35	15	8p/8k									34	47	5
1-2, 76-78			1										54	38	8
1-3, 70-72		26	1	1									30	70	
1-4, 25-27		35	1	1									TR	100	
<b>Hole 433A</b>															
2-1, 64-66	11 (Diatom)	28	27	10									37	48	15
3-1, 60-62		15	1										23	77	TR
3-5, 48-50		12	1										42	35	23
4-1, 69-70		47	1	1									51	33	18
4-2, 13-14	15 (Diatom)	58	2	1									84	11	5
4-2, 100-102	12 (Diatom)	58	1	1									28	10?	17
4-3, 50-52		50	1										30	55	10
4-4, 120-122		46	2	1									34	42	20
4-6, 50-52		37	1										TR	70	30
5-1, 50-52		39	1										16	74	10
6-1, 70-72		23	1										25	59	16
6-3, 80-82	12 (Diatom)	20	2										66	61	21
6-5, 69-71		32	2										12	77	11
6-6, 116-118		11	1					4					84	100	
6-7, 40-42	8 (Diatom)	45	3	1				5					38	38	
7-6, 87-89	(4)												96	0?	0?
8-1, 30-32	(1)												99	0?	0?
8-3, 6-8	(1)												99	0?	0?
9-2, 20-22			1										99	TR	
9-4, 34-36			4										96	96	
10-2, 76-78			4										96	TR	
10-6, 86-88			5										95	TR	
12-1, 90-92	(3)												97	0?	0?
13-1, 19-20			3	1	1								95	TR	
14-1, 68-70			3										97	TR	
16-1, 60-62		1	TR	TR					Gypsum?	99	99		TR		
19-1, 25-27		2	1	1					Gypsum?	96	96		TR		
<b>Hole 433B</b>									Gypsum?	96	96		0?	0?	0?
1-1, 30-32	(4)									96	96		TR		
1-4, 116-119				4											
<b>Hole 433C</b>															
3-1, 80-83		14	1	2						83	83		100		
3-3, 80-83	10 (Volcanic glass)	20	2	7						61	55		100		

<sup>a</sup>10 mol% MgCO<sub>3</sub> TR = Traces p = Plagioclase k = Potassium-Feldspars

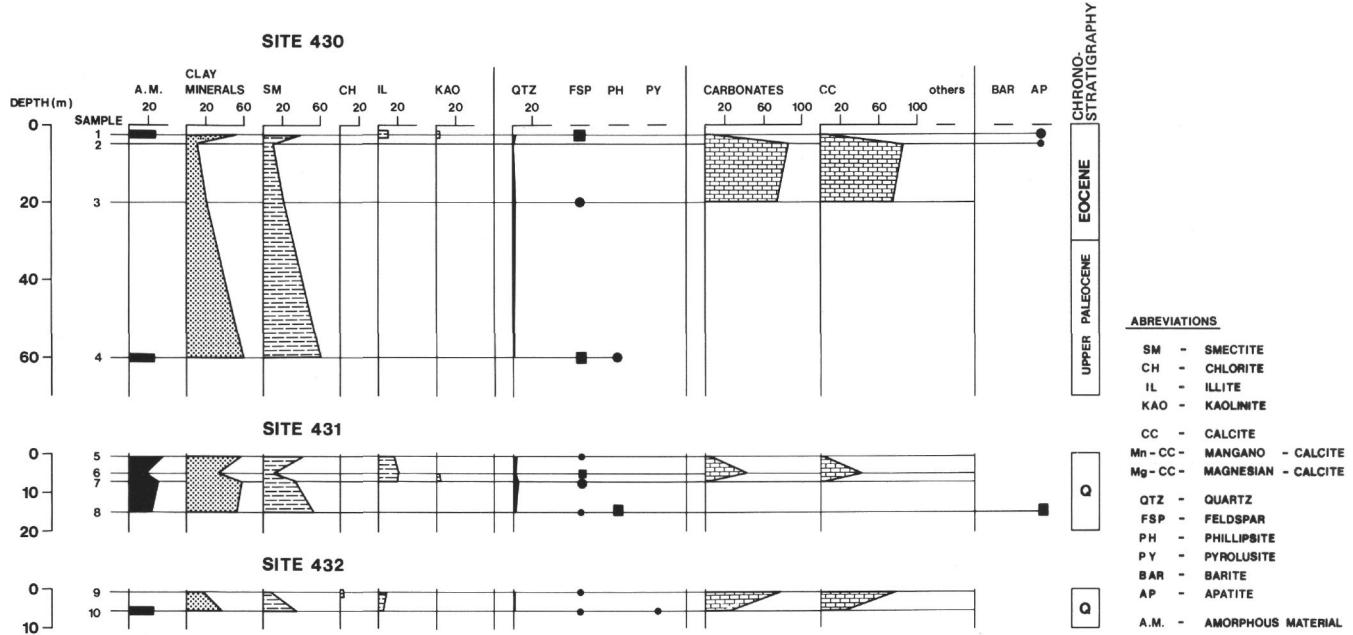


Figure 1. Bulk Mineralogy and Clay Mineralogy, Sites 430, 431, 432.

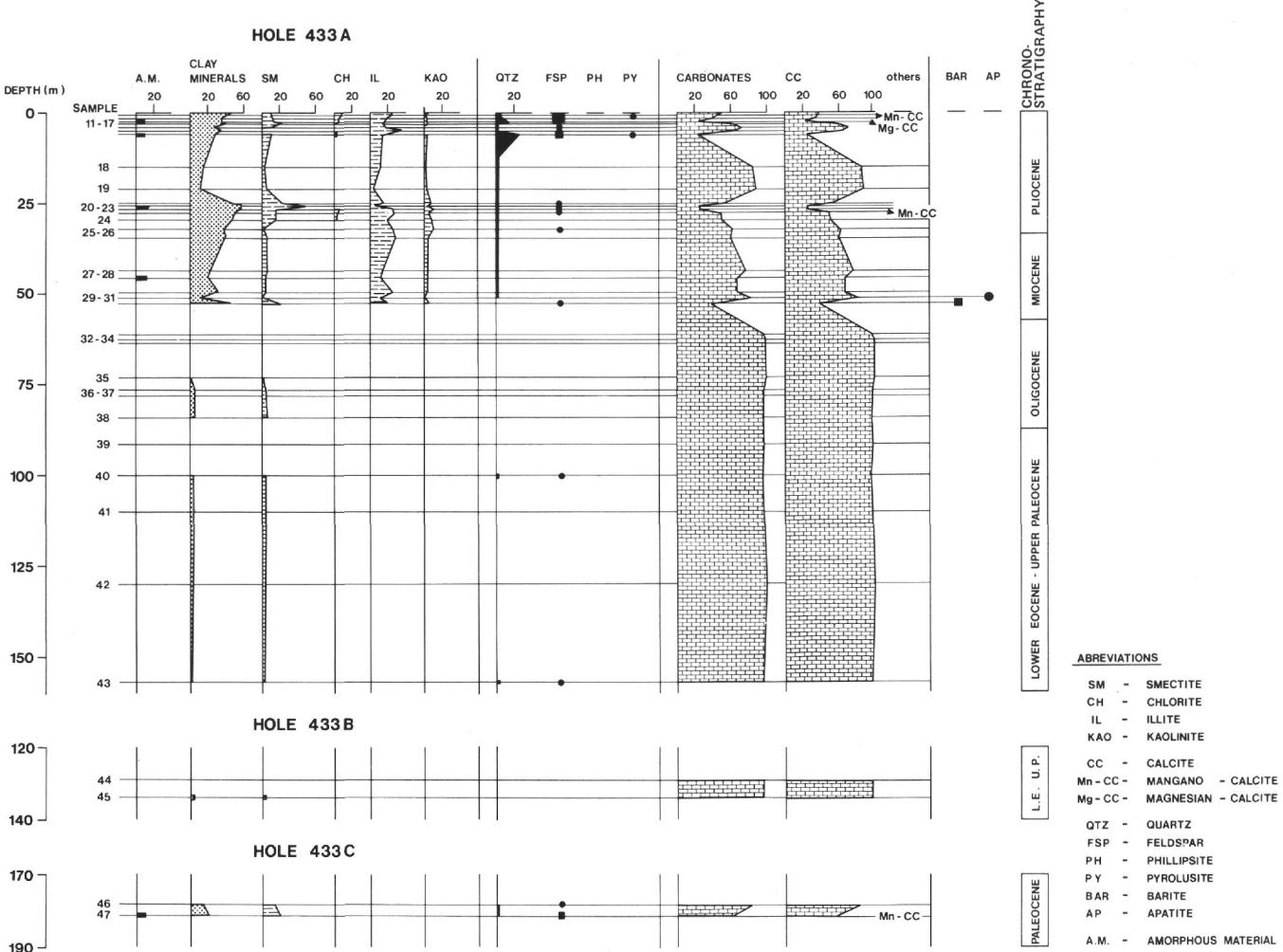


Figure 2. Bulk Mineralogy and Clay Mineralogy, Site 433.