

## XI. METAL CONTENT OF SURFACE SEDIMENTS

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### Introduction

Among 16 pelagic sediments obtained by means of grab sampler "Okean 70", 15 samples of surface sediments were analyzed for copper, nickel and cobalt. Observation of the samples indicates that carbonate and siliceous contents of the sediments vary with depth. The undisturbed part of the grab samples and those obtained by corers show many burrows and a distinct change in color between the surface layer and the lower part. The surface layer of about five to ten centimeters deep seems very homogeneous. The samples for chemical analyses were taken from this part. After drying at 110°C for two or three hours, 0.5 g of the powdered samples were treated by HF and analyzed by atomic absorption spectrophotometry.

Table XI-1 Metal contents of surface sediments.

Sample number*	Sediments	Cu (ppm)	Ni (ppm)	Co (ppm)	Manganese nodule concentration
St. 117 (4,940)	Siliceous- Calcareous ooze	226	223	135	Trace
St. 121 (5,450)	Siliceous ooze	314	213	129	21.0 kg/m <sup>2</sup>
St. 124 (5,200)	Siliceous- Calcareous ooze	295	207	125	8.7 kg/m <sup>2</sup>
St. 126 (5,030)	Siliceous- Calcareous ooze	289	211	110	13.0 kg/m <sup>2</sup>
St. 130 (5,270)	Siliceous ooze	240	160	123	0.2 kg/m <sup>2</sup>
St. 131 (5,190)	Siliceous ooze	294	212	118	Trace
St. 132 (5,100)	Siliceous- Calcareous ooze	227	201	105	13.8 kg/m <sup>2</sup>
St. 133 (5,200)	Siliceous ooze	323	201	113	2.0 kg/m <sup>2</sup>
St. 134 (5,560)	Siliceous ooze	306	203	130	Trace
St. 136 (5,320)	Siliceous ooze	261	196	101	Trace
St. 142 (5,150)	Clay	413	486	158	1.0 kg/m <sup>2</sup>
St. 143 (5,300)	Siliceous- Calcareous ooze	280	230	123	26.0 kg/m <sup>2</sup>
St. 144 (5,300)	Clay	327	309	142	7.0 kg/m <sup>2</sup>
St. 145 (4,930)	Siliceous- Calcareous ooze	146	158	89	1.0 kg/m <sup>2</sup>
St. 146 (5,610)	Clay	382	298	158	6.0 kg/m <sup>2</sup>
Average		288	234	124	6.65 kg/m <sup>2</sup>

\*Showing the bottom depth in meter.

### Analytical results

As shown in Table XI-1, the average content of metals is 288 ppm Cu, 234 ppm Ni and 124 ppm Co. Copper content of the samples ranges between 146 and 413 ppm, and nickel content ranges from 158 to 486 ppm, while content of cobalt is rather small, as compared with those of copper and nickel, ranging from 89 to 158 ppm. Fluctuation of the content of Cu, Ni and Co is, however, recognized among clay, siliceous ooze and siliceous-calcareous ooze.

The correlation between the copper and nickel content in the samples is shown in Fig. XI-1. Although analytical data is not abundant, a significant correlation seems to be present between the concentration of both elements. The metal content of the sample at St. 142 is highest and that of St. 145 is lowest among the analyzed samples. Examination of the relation between lithology of the sediments and their metal contents clarified that copper and nickel are richest in clay samples and poorest in siliceous-calcareous ooze samples, but there was no distinct difference between the metal contents of siliceous and siliceous-calcareous ooze. Reverse-correlation was recognized between the volume of foraminiferal material and metal contents. Such a tendency may be recognized from Fig. XI-2 in that the metal content of the surface sediments decreases as the foraminiferal material increases.

A great majority of the manganese nodules occur in areas of siliceous-calcareous ooze (St. 124, 126, 132, 143). Higher average concentrations of manganese nodules occur in the siliceous-calcareous ooze and the average value is more than twice as much as those from clay and siliceous ooze (Table XI-2).

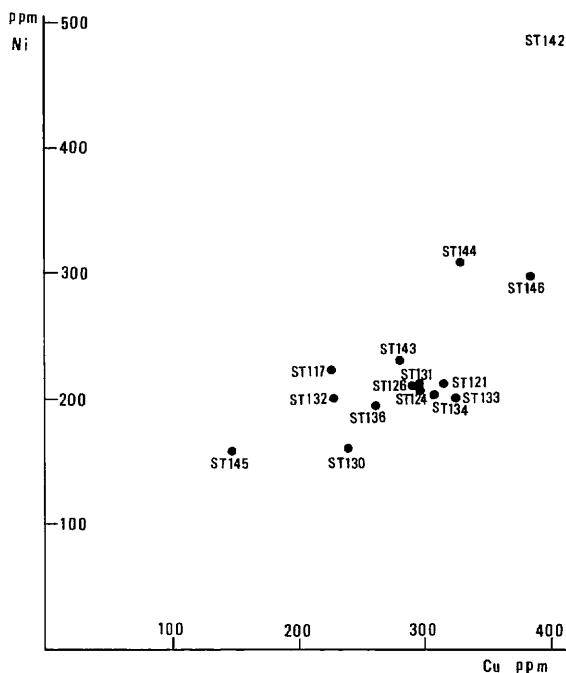


Fig. XI-1 Correlation between Cu and Ni content.

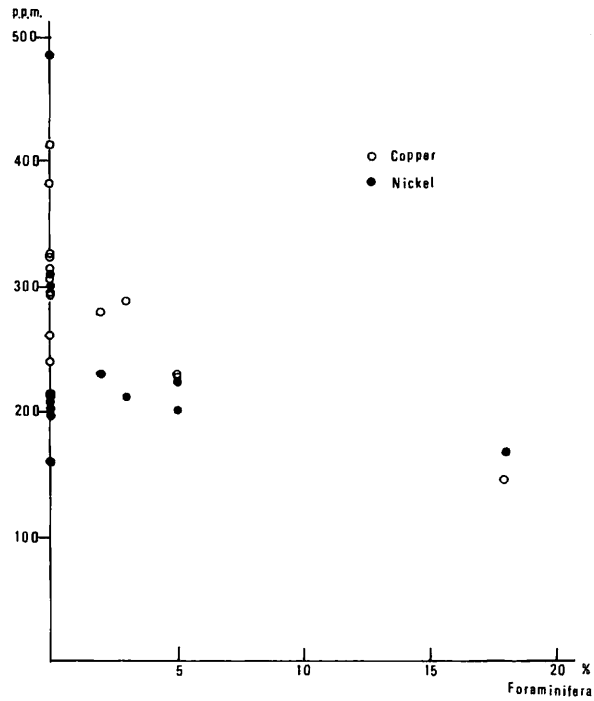


Fig. XI-2 Relation between foraminiferal volume percentage and metal contents of surface sediments.

Table XI-2 Average contents in three surface sediments.

Sediments	Cu (ppm)	Ni (ppm)	Co (ppm)	Manganese nodule concentration
Clay	374	364	153	4.7 kg/m <sup>2</sup>
Siliceous ooze	290	198	119	3.7 kg/m <sup>2</sup>
Siliceous-Calcareous ooze	244	205	115	10.4 kg/m <sup>2</sup>

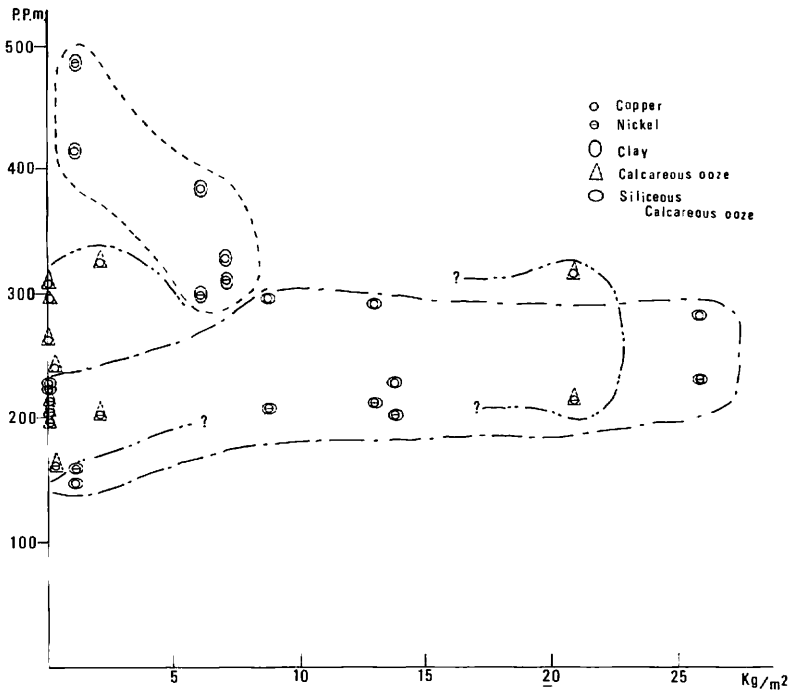


Fig. XI-3 Diagram showing the relation between the manganese concentration and metal contents of sediments.

Examination of relation between the concentration of manganese nodules and metal content of surface sediments roughly shows that the sediments in which higher concentrations of manganese nodules are distributed contain less metals (Fig. XI-3).