COMUNICACIONES

THE VARIATION TREND OF Mn, Fe, Cu, Zn, Li, K, Ba, Sr, Al, Mg AND Cr IN A BOX-CORE FROM THE GULF OF CALIFORNIA

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RESUMEN

Se usó la absorción atómica y la emisión de flama para analizar un número de muestras de sedimentos de una caja del Golfo de California (localización de la caja: 26° 12.'N, 111° 14.6' W). Los resultados presentados en gráficas, demuestran que los contenidos de algunos elementos (Li, Cr, K y Mg) son prácticamente constantes. Por otra parte los elementos como Zn, Sr, Fe y Al demuestran con la profundidad variaciones significativas en sus abundancias.

ABSTRACT

Atomic absorption and flame emission are used to analyze a number of sediment-samples from a box-core in the Gulf of California (location of the box-core: 26° 12.'N, 111° 14.6' W).

The results presented graphically show that the contents of some elements (Li, Cr, K and Mg) are practically constant while elements like Zn, Sr, Fe and Al show significant variations in their abundance with depth.

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INTRODUCTION

The study of marine sediments has attracted special attention in recent years. This is due to the fact that the interest has suddenly shifted to the search of important mineral sources in the sea as the land-resources are getting exhausted at an alarming rate. At the same time, new concept of plate tectonics unifying sea-floor spreading and continental drift has called for diverse studies in various parts of the world, especially in tectonically-active areas.

EXPERIMENTAL SET-UP

Box-coring technique has been utilized to recover bottom sediments. The box-core analyzed in this study was collected on a Scripps Institution of Oceanography cruise in the Gulf of California. A box of about 0.20m x 0.20m x 1.20m dimensions having a series of 2.25 cm. dia. holes on one of its sides allowed the sediments to be sampled from different depths in the box with no need of freezing them. The holes were first sealed with a masking tape, and after the box pull-out, a knife and a syringe used to extract samples from different holes. Sediments thus sampled were sealed in clean polyethylene bags and later dried in the laboratory at 40-50°C.

Approximately 1 gm of each of the dried samples was brought in solution form using standard methods and analyzed using a Perkin-Elmer atomic absorption digital spectrophotometer model 403 and a Carl-Zeiss flame photometer model RPQ 20A.

RESULTS AND DISCUSSION

The results of these measurements are presented in graphical form in Fig. 1 and in condensed form in Table 1. Also included in the table are average data on deep-sea sediments and earth's crust.

In this preliminary study we have not observed any significant variations in Li and Cr abundances and to a lesser extent K and Mg.

On the other hand, other elements show significant variations in their abundance. The correlation in Fe and Al abundances is particularly notable, with the Fe/Al ratio being practically constant.

In other works of this nature, elemental abundance variations have been related to the sedimentation rates, but they deal with much longer sediment-cores (~ 1000 cm.) with ages of 30-40 thousand years. (e.g., Tieh and Pyle, 1972; Angino *et al.*, 1972). On the other hand, the box core analyzed in this work is possibly not much older than a few hundred years (Koide *et al.*, 1973).

The over-all picture of these variations can be understood through detailed studies covering aspects like:

a) The chemical analysis of different grain-size fractions
b) The mineralogy of the sediments
c) Geochemical behavior of the elements
d) Analysis of acetic acid-soluble fraction
e) Contents of biogenic material
f) Age-determinations of the sediments

As an example, the variation in Zn – abundance can possibly be related to the distribution of organic material. Several thousand ppm Zn has been found in sediments containing phosphorites or marine phosphates. In the same manner, the mineralogy of the sediments plays an important role in controlling their chemical composition. Study of some these aspects is underway.

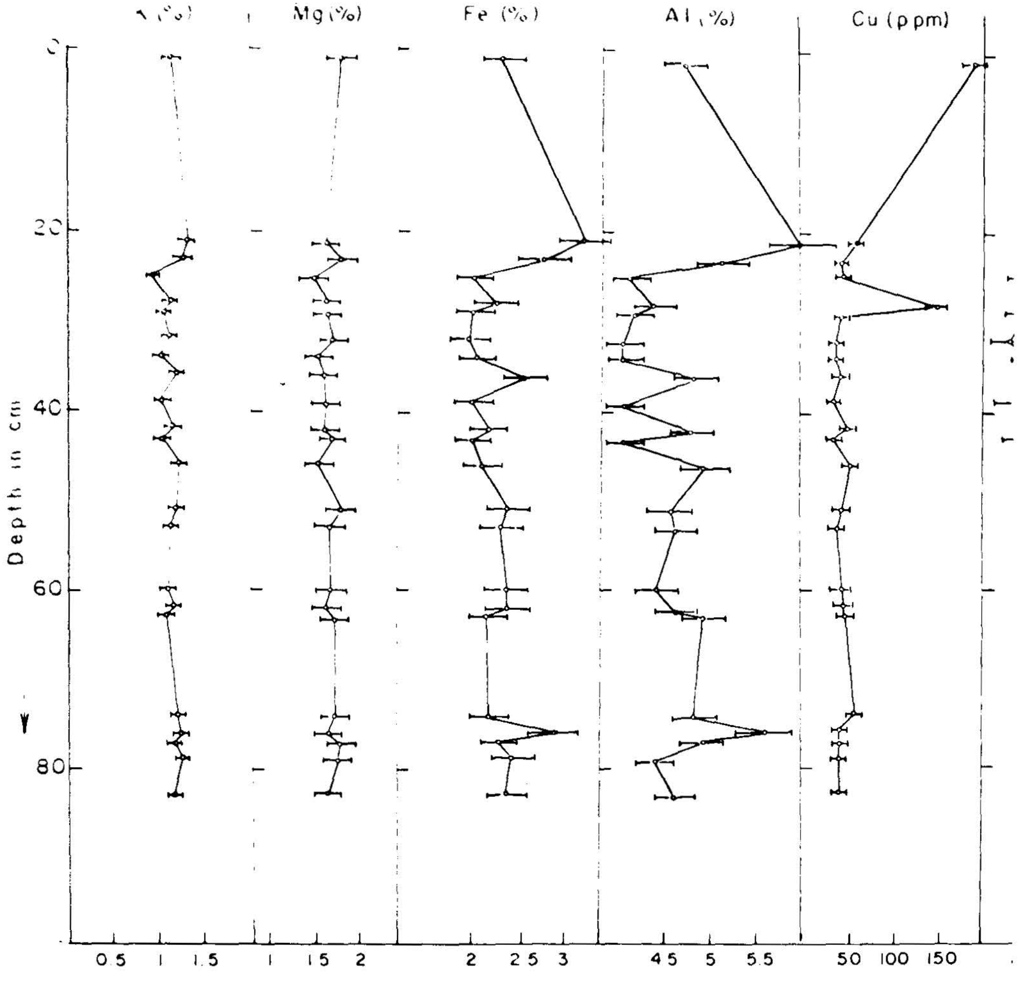
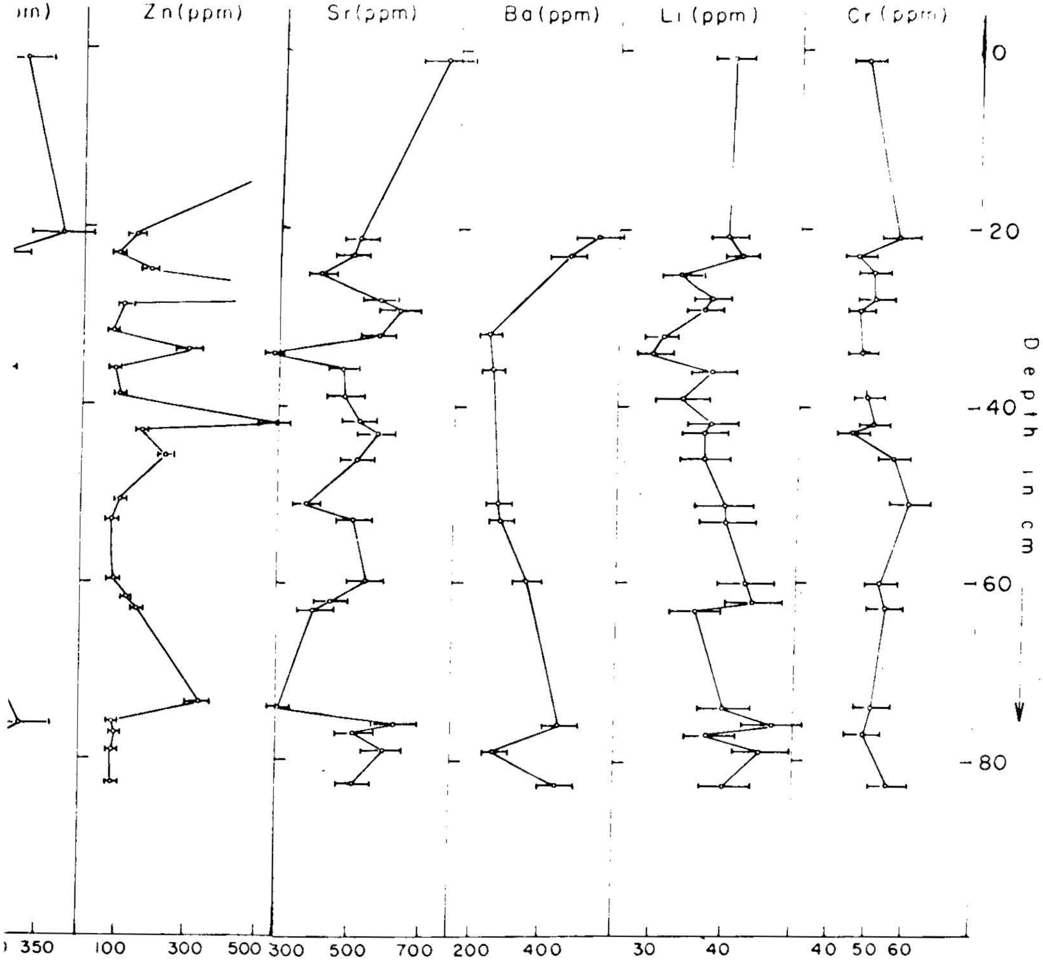


Fig I ELEMENT DISTRIBUTION VERSU



EPTH IN THE BOX-CORE STUDIED

Table 1: Analytical results for a box-core from the Gulf of Califonia

(The contents are in ppm except where indicated %)

Element	Mn	Fe %	Cu	Zn	Li	K %	Ba	Sr	Al	Mg	Cr
Mean $\bar{X}$	278	2.31	55	330	39	1.15	339	523	4.63	1.68	52
Standard deviation $_{s/n}$	36	0.31	36	570	4	0.09	116	109	0.50	0.09	4
Range	228-376	1.95-3.23	37-190	85-2110	30-47	0.91-1.32	170-536	286-780	3.91-5.99	1.50-1.87	45-61
No. of samples analyzed	23	23	23	23	23	23	11	23	23	23	17
Deep-sea Sediments* Clay	6700	6.5	250	165	57	2.5	2300	180	8.4	2.1	90
Carbonate	1000	0.9	30	35	5	2.9	190	2000	2.0	0.4	11
Earth's Crust**	950	5.63	55	70	90	2.09	425	375	8.23	2.33	100

* The deep-sea sediments' values are taken from Turekian and Wedepohl (1961)

** The crustal abundance taken from Taylor (1964).

BIBLIOGRAPHY

ANGINO, E. E., W. R., BRYANT and J. L., HARDING, 1972. Trace element geochemistry of carbonate sediments, Yucatan shelf, Mexico in R. Rezak and V. J. Henry (Ed). Contributions on the Geological and Geophysical Oceanography of the Gulf of Mexico. Texas A & M University *Oceanographic Studies*, vol. 3: 281-2900.

KOIDE, M., K. W. BRULAND and E. D. GOLDBERG, 1973. Th-228/Th-232 and Pb-210 geochronologies in marine and lake sediments. *Geochim. Cosmochim.* Acta 37: 1171-1187.

TAYLOR, S. R., 1964. Abundance of chemical elements in the continental crust; a new table. *Geochim Cosmochim.* Acta 28: 1273-1285.

TIEH, T. T. and T. E. PYLE, 1972. Distribution of elements in Gulf of Mexico Sediments in R. Rezak and V. J. Henry (Ed.) Contributions on the Geological and Geophysical Oceanography of the Gulf of Mexico. Texas A & University *Oceanographic Studies*, vol. 3: 129-152.

TUREKIAN, K. K. and K. H. WEDEPOHL, 1961. Distribution of the Elements in some major units of the Earth's Crust. *Geol. Soc. Amer. Bull.*, 72: 175-192.