C

Distribution of Mercury in Aegean Coastal Sediments

A. BALCI, H.-A. BENLI and F. KUCUKSEZGIN

Institute of Marine Sciences and Technology, Dokuz Eylül University, Izmir (Turkey)

In this study, the distribution of mercury in suspended matter and sediment of the Aegean Sea were investigated. The total mercury content in deposited sediments ranges between 0.09 ug /g and 3.61 ug/g with mean of 0.91 ug/g.

MATERIAL AND METHOD

Mercury was detected flameless atomic absorbtion spectrophotometry (AAS) using cold vapour technique stripping by an argon flow the metallic mercury reduced by an $SnCl_2$ acid solution.

Water samples for suspended material were filtered through 0.45 um pore size preweighted Nucleopore filter. Study area and sampling stations are shown in Figure 1.

RESULTS AND DISCUSSION

Concentrations of total mercury in surface sediments from Aegean Sea are given in Table I. Highest cocentration of mercury in the Aegean have been obtained at Karaburun Peninsula. Karaburun mining region, for the Aegean, the must important source of mercury. But even if it not being mined, it might be responsible for appreciable amounts of mercury being carried by surface erosion and rivers in to Aegean Basin. Küçük Menderes and Büyük Menderes rivers flow through the mercury-bearing ores and cary mercury rich material in to the Aegean Sea. It has been reported that the amount of mercury trasported to the Aegean Sea by rivers is about 14 ton/years (UNEP 1984). Continental weathering and subsequent erosion play an important role in determining the mercury content of rivers and thus amount of mercury entering the Aegean.

The mercury load on suspended particles in rivers ranged between 4 and 231 ug/g. In estuaries, the suspended matter is more contaminated than the deposited sediments. This is due to its greater amount of fine grained particles and organic matter to which trace metals used to be associated Cranston and Buckley, (1972). The mercury content of suspended matter in rivers are given in Table II. High level of mercury on suspended particles in Küçük Menderes river.

STATION	n	R	X
1	7	0.09-1.32	0.60
2	3	0.70-0.91	0.82
4	6	0.43-3.61	1.39
5	4	0.96-1.68	1.03
12	2	0.39-1.19	0.79
13	6	0.09-1.91	0.87
14	7	0.17-1.28	0.81
16	3	1.43-3.47	2.32
17	4	0.47-2.06	1.05
18	6	0.36-1.15	0.74
22	-	0.39-1.33	0.83
40	2	0.24-0.73	0.49
41	2	0.64-0.88	0.76

Table : I Mercury concentrations in Aegean Sediments (ug/g)
n: number of sample, R: Range X: mean

Rivers	TSM (mg/l)	Particulate Hg Range	(ug/g) mean
Meriç	32	4-231	32
Havran	34	10-26	35
Gediz	77	8-83	46
K.Mend.	7	24-231	152
B.Mend.	46	38-149	84

Table : II Particulate Mercury and total suspended material (TSM) in some rivers.

CONCLUSIONS

Industrial sources and the frequent natural geochemical anomalies in Aegean sea influence the mercury distribution in the marine sediments, adjacent to these sources. Near the river mouths due either to anthropogenic or natural sources, sediments show higher levels. The pattern of distribution of mercury in coastal sediments indicates that suspended particulate matter is the main vehicle for mercury from land based sources to marine environment. Another aspect which is worth further investigation is whether the inflow of waters through the straits of dardanels might represent an appreciable input or output of mercury in Aegean sea.

REFERENCES

BERNHARD and RANZONÍ (1977): Mercury concentration in Mediterranen marine organisms and their environment natural or anthropogenic origin. Thlassia, Jugo., 13:265.300

CRANSTON, R.E. and D.E.BUCKLY (1972): Mercury pathways in a river and estuary. Environ. Sci. Techn., 6:274-8

FLEİSCHER, M. (1973): Natural Sources of some trace metals in the environment in cycling and control of metals, Cicinnati, National Env. Resch. Cent. pp.3-10

UNEP (1984): "Pollutants from the Land Based Sources in the Mediterranean" Unep Regional Seas Reports and Studies NO:32

Manganese, Iron, Cobalt, Nickel and Zinc in the Eastern Harbour and El-Mex Bay waters of Alexandria

Hosny I. EMARA and M.-A. SHRIADAH

National Institute of Oceanography, Alexandria (Egypt)

The concentrations of manganese, iron, cobalt, nickel and zinc have been determined by atomic absorption spectrophotometry on 970 sea-water samples from 8 stations in the Eastern Harbour and 7 stations from El-Mex Bay (Fig. 1) of Alexandria during the period from November 1987 to January 1989. Trace metals concentrations are scattered in the ranges (0.14-30.7), (1.39-148.0), (nd-0.32), (0.09-1.43) and (2.02-320.7) $\mu g.l^{-1}$ respectively.

The concentrations of trace metals in both areas are in the order Zn > Fe > Mn > Ni > Co at the surface and near the bottom water. El-Mex Bay, the most industrialized area in Alexandria, showed higher levels of Mn, Co, Ni and Zn in the bottom water than in the surface water. On the other hand, with the exception of Zn, the surface water of the Eastern Harbour reflects higher values in comparison with the bottom water.

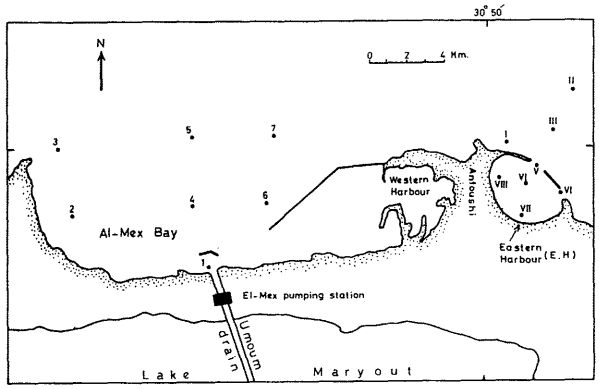

Fig. 1 - Area of investigation

Generally, the Eastern Harbour reveals slightly higher levels of Fe, Co, Ni and Zn than El-Mex Bay water.

Trace metals Mn, Fe and Zn distribution suggests a clockwise circulation pattern of fresh water discharging from Umoum drain to El-Mex Bay. The Eastern Harbour which is polluted by sewage, showed a tendency to concentrate Fe and Zn inside the harbour by 14 and 39% more than outside the barour, while Mn, Co and Ni showed nearly the same level.

The distribution of Zn showed a rate of decrease of 15.9 $\mu g.l^{-1}.km^{-1}$ in the Eastern Harbour and can be used as a good tracer for fresh water or sewage discharge.

The appearance of local high concentration for one metal by possible contamination does not necessarily correlate with high values for other metals, however the relationships Fe-Mn (r=0.80) Fe-Zn (r= 0.80), Mn-Zn (r= 0.85) showed good correlation for the bottom water as well as for the surface water (Mn-Ni, r= 0.80) of El-Mex Bay. The Wastern harbour also showed good correlation between Fe and Co (r= 0.83), Mn and Co (r= 0.60) for the surface and bottom water respectively.

The present data show that the concentrations of trace metals compared to other regions in the world are higher, probably due to the increasing pollution from industrial waste and domestic sewage.