

LEVELS AND TRENDS OF THE POLLUTION OF CHLORINATED HYDROCARBONS IN MUSSELS FROM THE KAŠTELA BAY (MIDDLE ADRIATIC)

M. PICER, N. PICER and J. DUJMOV^o

Center for Marine Research, Rudjer Boskovic Institute, Zagreb (Yugoslavia)
^o Institute for Oceanography and Fisheries, Split (Yugoslavia)

The contamination of the Adriatic Sea by chlorinated hydrocarbons has been relatively well documented. The Kaštela Bay, a semienclosed basin, is especially susceptible to pollution and usually considered to be a heavily stressed ecosystem. A survey was carried out during 1984 - 1985 to measure the existing concentrations of some chlorinated insecticides (DDT and its analogous, DDE and DDD and dieldrine) and polychlorinated biphenyls in natural population of mussels growing in the Bay. During 1984 to 1985 mussels were collected seasonally (during spring, summer, autumn and winter) at three stations. The results of the investigation are presented in Figure 1. It can be seen that each station is unique in a certain way compared with the neighbouring stations, with respect to the residue level, variations in concentration with seasons and the ratio of the PCB/DDT_{total}. The ratios of the PCB/DDT_{tot.} are significantly higher than 1.

Factors that may play a role in causing the observed fluctuations of chlorinated hydrocarbon concentrations and the comparison of the data obtained in the 1977 - 1979 collection period are also discussed.

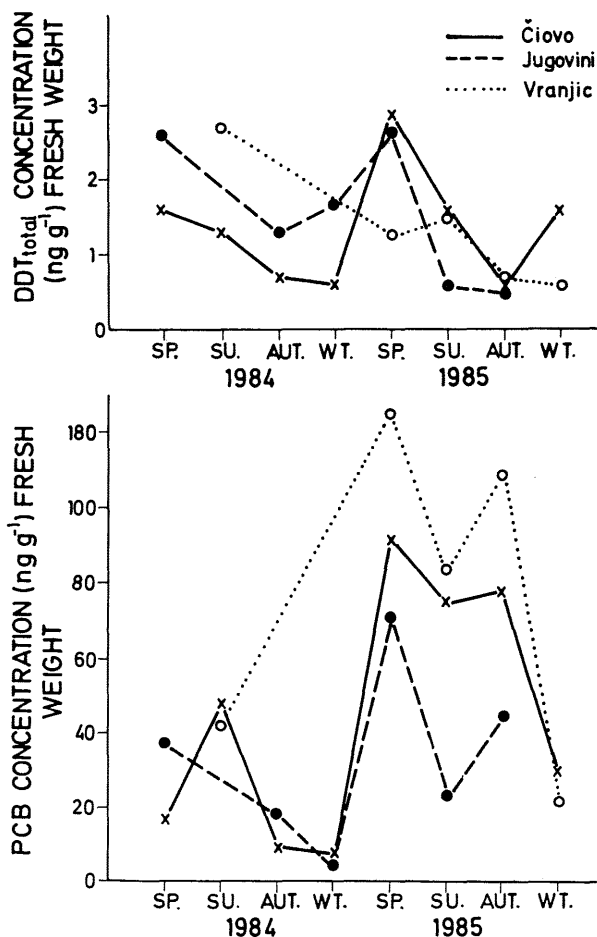


Fig. 1. DDT_{total} and PCB in mussels from the Kaštela Bay sampled from spring 1984 to winter 1985.

EXPERIMENTS ON THE REVERSIBILITY OF TRANSFER

- DEPOSITION PROCESSES OF METALS UNDER INTERMITTENTLY ANOXIC CONDITIONS

M.J. SCOULLOS, Ch. ZERI, M. DASSENAKIS & E. TSAMAKI

Department of Chemistry, University of Athens,
 13a Navarinou Str., Athens (Greece)

The deposition of metals under anoxic conditions is well documented (ref. 1). However rather little is known about the reversibility of the process when well oxygenated water is again in contact with recently deposited particles. In order to study this process, several sediment cores 30-60 cm long were taken from the same coastal site in the NW section of the gulf of Elefsis in Perspex tubes. Three of them which correspond to "extreme" redox conditions are presented here. Column A represents the natural conditions "in situ" (DO 7.5 ppm, pH 7.5). The water of the other two columns, B and C, was subjected to gradual deaeration by bubbling argon gently for many hours, until no oxygen was traced and the pH dropped to 7. Column B was left in anoxic conditions for one week and then was treated and analysed. In column C oxygen was bubbled until DO was raised to 10 ppm and pH to 8.

In all cases the overlying waters were filtered through 0.45 μm filters. Particles were treated with HNO₃ in Teflon beakers. Dissolved metals were preconcentrated by using Chelex-100 resins. Surface sediments were wet-sieved by using a 0.61 μm nylon net. Both size fractions were shaken for twelve hours with 0.5N HCl and the extracted metal was determined by flameless AAS.

Results and Discussion

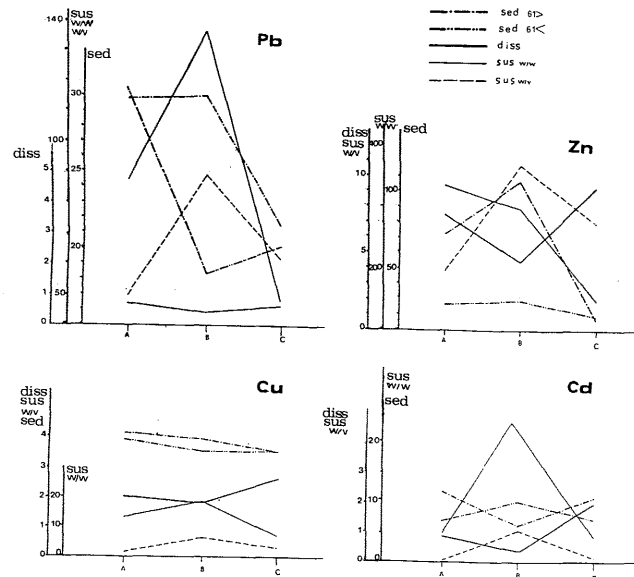
The concentration of several trace metals in the dissolved and particulate phases and in surface sediments are shown in the figures.

It becomes clear that for lead, zinc, cadmium and copper, the reduction of the dissolved species in column B (when anoxic conditions prevail) is followed by an increase in the particulate species due mainly to the formation of sulphides. The dissolved metal levels are raised in column C where the water is again saturated with oxygen. The reversibility of the process was reflected also in the surface sediments for lead and zinc.

The concentration of copper in the sediment did not show any appreciable change whereas cadmium showed a decrease of the concentration in the <61 μm sediment fraction but an increase in the 61 μm < one.

When high oxygen concentration is restored dissolved metal is readily transferred in the particulate phase but deposition is not always noticed within the limited time available for the laboratory experiment.

The general conclusion of this exercise is that it confirms the rapid reversibility of metal transfer-deposition processes in intermittently anoxic regimes observed in our earlier "in situ" studies (ref. 2,3,4). Further development of these experiments may offer a useful tool for the assessment of upward fluxes of metals in areas where anoxic conditions prevail for short periods.



Variation in trace metal levels in the dissolved (μg/l) and particulate (μg/g) phases and in surface sediments (μg/g) under oxic (A & C) and anoxic (B) conditions.

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