

A preliminary investigation of Cu, Cd and Zn concentrations in seawater from Northern Saronikos Gulf, Greece by Differential pulse Anodic Stripping

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Abstract Saronikos Gulf receives the domestic sewage and industrial effluents of the Greater Athens area. Previous work has shown that the sediments around the outfall have accumulated high concentrations of trace elements. In this study we report and discuss results of a preliminary survey of Cu, Cd and Zn in surface seawater by Differential pulse Anodic Stripping.

Résumé Le Golfe de Saronique reçoit les effluents domestiques et industriels de la région d'Athènes. Des travaux précédents ont montré que les sédiments autour de la sortie de l'égout ont accumulé de hautes concentrations des éléments en traces. Dans cette étude, nous reportons et discutons les résultats d'une étude préliminaire de Cu, Cd et Zn dans l'eau de mer de surface.

Saronikos Gulf receives the combined domestic and industrial sewage of the Athens Metropolitan area mainly through the Central Sewage Outfall at its northern part. These discharged wastes have resulted in elevated concentrations of toxic and other trace elements in the sediments of at least 100 km² of seafloor (1), (2).

During spring 1979 surface seawater samples from the northern part of Saronikos Gulf were collected from six locations in order to investigate

the effects that the combined domestic sewage and industrial wastes have on the concentrations of Cu, Cd and Zn in the water column. Filtered samples were analyzed by Anodic Stripping Voltametry with a thin mercury film glassy carbon rotating electrode after adjusting the pH at 5.0. The detection limits of the method were as follows: 0.02 Cu $\mu\text{g/l}$, 0.008 Cd $\mu\text{g/l}$ and 0.02 Zn $\mu\text{g/l}$. The precision of the method is estimated to be within $\pm 5\%$ in terms of standard deviation.

Concentrations of the three metals determined in surface waters of the Northern Saronikos Gulf ranged as follows: Cu 1.0-3.5 $\mu\text{g/l}$, Cd 0.15-0.70 $\mu\text{g/l}$ and Zn 3.7-18 $\mu\text{g/l}$. These concentrations are higher than concentrations reported for Aegean sea open waters (Cu: <0.04-0.64, Cd: <0.02-0.12 and Zn: 0.9-5.8 $\mu\text{g/l}$) (3).

All three metal concentrations show an increase in Perama channel, where a lot of shipping and boat building activity is taking place, and close to the central sewage outfall. Thus, two sources for metal inputs can be identified: the Perama channel and the Athens Central Sewage outfall. These two sources have also been identified from trace element concentrations in sediments (1), (2).

Determinations of Cu, Cd and Zn were made in filtered sea water at a pH of 5.0. Thus concentrations reported here represent dissolved labile inorganic and organic complexes and labile metals adsorbed on organic and inorganic colloids. Thus, metals in the central outfall sewage are probably partially solubilized when dilution and oxidation by sea water occurs and only part of them is accumulated in the sediments of the area.

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