

## Heavy metal concentrations in the Kerkyra Strait (N.E. Ionian Sea)

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Kerkyra Island is situated in the uppermost Northeastern part of the Ionian Sea. The study area is located between the Kerkyra Island and the Northwestern part of Greece. It communicates with the Ionian Sea through two straits: 1 n.m. wide in the North, 6 n.m. in the South; maximum width of the area 16 n.m. (Fig.1). The depth contours generally follow the coastal lines, and maxima of around 70 m are attained in the central part of the region. There is a shallow (<20 m) embayment north of the Kalamas River Delta.

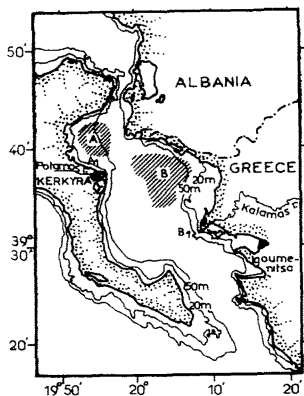


Table I : The study area, the bathymetry and the areas mentioned in the text.

The main interest of the study is focused in the marine environment around the city of Kerkyra, with a permanent population of 40.000 inhabitants and over 100.000 tourists a year. The study area receives agricultural and industrial wastes brought by the Kalamas River and some by a small torrent north of the city of Kerkyra. The goal of this study is to assess the environmental state of the region, as far as heavy metal pollution is concerned, and to answer to questions related to the impact of the domestic waste disposal through a central sewage outfall system, which will be constructed soon.

Surface sediment samples were collected during 3 cruises in 1990-91 over a grid of 102 stations, using a 0.1 m<sup>2</sup> van Veen grab. The sample network was particularly dense in the sea area off the city of Kerkyra. The samples were examined for organic carbon and the metals Fe, Cr, Ni, Mn, Zn, Co, Cu and Pb.

The extraction of the metals was achieved with 2N HCl and the determination of the metal content in the leachates was performed on a Perkin-Elmer 305 B A.A.S. (SATSMADJIS & VOUTSINOÛ-TALIADOURI 1981). Organic carbon was obtained according to GAUDETTE, *et al.*, 1974. Analyses were performed in triplicate. The reliability of the whole process had been ascertained in Intercalibration Exercises (I.A.E.A., 1978). The analyses indicated the following average standard deviations and coefficient of variations: Fe (%): 0.85, 4.4; Mn (mgkg<sup>-1</sup>): 38, 5.0; Zn (mgkg<sup>-1</sup>): 4.3, 7.2; Cr (mgkg<sup>-1</sup>): 3.8, 3.4; Ni (mgkg<sup>-1</sup>): 3.3, 4.1; Co (mgkg<sup>-1</sup>): 0.9, 8.2; Cu (mgkg<sup>-1</sup>): 1.1, 4.8; Pb (mgkg<sup>-1</sup>): 0.8, 6.7.

The mean values of the analyses are depicted in Tables I & II. Most organic carbon values range from 0.4 to 1.1% and do not indicate any anthropogenic input.

Heavy metal concentrations are generally low and depict almost the same ranges as those obtained, with similar methodology, in other Greek coastal unpolluted regions (Table I).

Table I : Heavy metal concentrations in Greek coastal unpolluted regions (Data for East Aegean Sea, Amvrakikos Bay, South Euboikos Gulf, Lesbos Island, Messolonghi Lagoon, Milos Island, Navarino Bay and Pagassitikos Gulf from VOUTSINOÛ-TALIADOURI, 1988)

Area	Fe (%)	Cr (-----)	Ni	Mn	Zn	Co	Cu	Pb
-----ppm-----								
Kerkyra Isl.	0.70-3.40	35-257	65-190	200-1400	21-94	2-24	7-30	8-24
East Aegean S.	1.40-3.00	52-157	39-291	280-2640	25-55	8-24	4-29	11-22
Amvrakikos B.	0.49-3.05	27-177	33-188	323-3820	12-80	4-30	2-31	7-21
S.Euboikos G.	0.60-1.50	37- 90	25-144	165- 555	25-44	4-15	0-40	12-27
Lesbos Island	0.32-2.10	40-247	20-315	172-1126	18-43	0-19	3-12	10-39
Messolonghi L.	1.00-2.80	56-112	40-112	470-1380	30-80	6-16	8-34	6-17
Milos Island	0.30-0.60	10- 19	6- 21	113- 251	15-18	2- 4	2- 4	2- 7
Navarino Bay	0.20-3.00	12-251	8-123	243- 600	7-81	4-15	0-32	2-28
Pagassitikos G.	1.30-3.00	50-186	32-228	290-2790	38-72	8-22	9-25	19-30

In general, heavy metal concentrations display the same distribution pattern: four regions with slightly enhanced concentrations.

i) area A: (Fig.1) the enrichment factors of the metal concentrations in this area range from 1.47 to 2.07 (Table II); ii) area B: the enrichment factors of the metal concentrations (except Pb) range from 1.10 to 1.70; iii) area A1 (at the mouth of the torrent Potamos): the concentrations of Pb and Cu are slightly elevated and iv) area B1 (at the mouth of the Kalamas River): the concentrations of Cu, Co and Cr are slightly elevated.

Table II: Heavy metal enrichment factors in the study area.

	Fe	Cr	Ni	Mn	Zn	Co	Cu	Pb
Area A	1.85	1.62	1.47	1.75	1.70	1.60	2.07	1.50
Area A <sub>1</sub>	-	-	-	-	1.10	-	1.23	1.33
Area B	1.22	1.10	1.10	1.70	1.10	1.20	1.24	-
Area B <sub>1</sub>	-	1.32	-	-	-	1.60	2.00	-

The slight enrichment in heavy metal concentrations encountered in areas A and B (covered by fine-grained sediment) is attributed to the physicochemical processes of the material supplied by the nearby rivers. In conclusion, surface sediments of the study area show heavy metal concentrations similar to those reported for other unpolluted Greek areas, although a slight anthropogenic enrichment of the concentrations of Cu, Co, Cr and Pb at the mouth of the rivers is sustained.

## REFERENCES

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