

# TRACE METALS IN MUSSEL AND SEDIMENT SAMPLES FROM SOUTHEASTERN COAST OF THE BLACK SEA

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## Abstract

The concentrations of trace metals were determined in mussel and sediment samples collected from Yomra at the southeastern coast of the Black Sea. In mussel samples besides of some major elements, As, Zn, Cd, and Se values were higher than sediment samples. The levels of the Mn, Fe, As, Co, Al, Hg and Sc were slight higher at 50 m depth than 200 m depth sediment. On the other hand, the concentrations of the Cu, Pb, Zn, Ni, Sr, Cr, Mg and Ba are high at the 200 m depth sediment.

**Keywords :** *Black Sea, Metals, Sediments.*

Pollution levels in the Black Sea have increased due to oil pollution and airborne contaminants [1]. Moreover metal pollution are related to agricultural run offs, insufficient treated sewage effluents and wastes derived from little industry companies in southern east cost of the Black Sea. At the same time, the release of large quantities of soil particles into the Black Sea is the result of high erosion [2]. The objective in this work was to understand the biogeochemical composition of the southern east shelf region under summer conditions with regard to metals in mussel and sediment samples.

Tab. 1. Metal levels in mussel and sediment samples ( $\mu\text{g.g}^{-1}$  dry weight).

Metal	Mussel	Sediment (50m)	Sediment (200m)
Cu	10.35 ± 1.43	60.2 ± 5.58	62.7 ± 5.81
Pb	0.89 ± 0.14	40.4 ± 2.87	43.6 ± 3.09
Zn	180.2 ± 13.996	118.0 ± 6.86	184.0 ± 10.70
Mn	10.0 ± 0.89	718.0 ± 48.10	641.0 ± 42.94
Fe	120 ± 7	41600 ± 2611	41200 ± 2586
As	9.20 ± 2.72	9.5 ± 0.93	8.8 ± 0.86
Cd	1.08 ± 0.25	0.2 ± 0.02	0.3 ± 0.02
Mo	0.22 ± 0.05	0.6 ± 0.05	0.9 ± 0.07
Ag	0.005 ± 0.001	0.2 ± 0.02	0.2 ± 0.02
Ni	0.60 ± 0.12	27.7 ± 1.98	34.5 ± 2.46
Co	0.24 ± 0.04	17.4 ± 1.33	17.1 ± 1.30
U	0.030 ± 0.001	0.9 ± 0.07	1.2 ± 0.1
Th	0.020 ± 0.001	5.2 ± 0.45	5.6 ± 0.48
Sr	16 ± 1.42	128.0 ± 10.81	192.0 ± 16.21
Sb	<0.02	0.3 ± 0.02	0.4 ± 0.03
V	<2	82.0 ± 6.39	90.0 ± 7.01
Ca	190.0 ± 19.59	17500 ± 1129	26400.0 ± 1703.20
P	10490.0 ± 1628	1060.0 ± 79.50	1150.0 ± 86.25
Cr	1.50 ± 0.35	25.0 ± 1.84	29.0 ± 2.13
Mg	112.0 ± 12.11	14500.0 ± 966.67	14600.0 ± 973.33
Ba	0.40 ± 0.06	98.0 ± 6.80	124.0 ± 8.61
Ti	36.0 ± 4.50	670.0 ± 54.03	720.0 ± 58.07
B	6.0 ± 0.73	12.0 ± 1.12	13.0 ± 1.21
Al	<100	29800.0 ± 2237.30	29500.0 ± 2214.80
Na	2740 ± 1370	3450.0 ± 330.82	6900.0 ± 661.64
K	5300.0 ± 620.61	2500.0 ± 170.45	3200.0 ± 218.18
Hg	0.039 ± 0.004	0.26 ± 0.017	0.07 ± 0.005
Sc	0.20 ± 0.07	8.5 ± 0.68	8.3 ± 0.66
Tl	<0.02	0.1 ± 0.008	0.1 ± 0.007
S	11400.0 ± 3257.14	900.0 ± 42.86	4000.0 ± 190.48
Se	2.20 ± 0.76	<0.5	0.5 ± 0.03

Two sampling stations were chosen from Yomra where is located in south-eastern coast of the Black Sea for sediment samples. Samplings were realized in June, 2006. Mussels (*Mytilus galloprovincialis*) were collected from the same area. Prior to metal analysis, the soft parts were dissected, and dried at 85 °C for 48 h. 1 g sample leached with 2 ml HNO<sub>3</sub> for 1 h, then 6 ml 2-2-2 HCl-HNO<sub>3</sub>-H<sub>2</sub>O at 95 °C for 1 h, diluted to 20 ml, and analyzed ICP-MS. Surface sediment samples were taken from depths of 50 and 200 m using Ekman-type graph sampler. Samples were sliced into 0-4 cm layers with three replicates and desalted using distilled water. On arrival to the laboratory <63 $\mu\text{m}$  size fractions were separated and dried at 85 °C for 48 h 0.5 g sediment sample leached with 3 ml 2-2-2 HCl-HNO<sub>3</sub>-H<sub>2</sub>O at 95 °C for 1 h, diluted to 10 ml, and analyzed by ICP-MS. The results obtained for mussel and sediment samples are shown in Table

1. In mussel samples besides of some major elements, Zn, Cd, and Se values were higher than sediment samples taken from depth of 50 m, also As, Cd, and Se values were higher than samples taken from 200 m. In sediment samples taken from depth of 50 m Co, Mn, Fe, As, Au, La, Al, Hg, Sc and Ga values were higher than samples taken from 200m. Therefore other elements were high in 200 m except Ag and Tl which have equal values. Our Cu and Pb values in mussel samples were generally higher than western coast of the Black Sea except Ünye and Amasra [1], [3]. At the same time Cu, Zn, and Mn values were higher than Rize and Pazar samples [4]. In the present study Cu, Fe, Mn, Pb and Zn values in sediment samples were generally higher than western coast of the Black Sea. On the other hand our Cu, Fe, Mn, and Zn values were generally lower than Rize sediments. When this study is compared with a previous work, which was carried out at the same station in winter condition, Cd values decreased in sediment samples. In contrast Cr, Cu, Fe, Mn, Ni, Pb, and Zn values increased [5]. In general, our results showed that the Pb, Cu and Mn values were found relatively high in mussel and sediment samples than southern west coast of the Black Sea.

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