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PECULIARITIES IN THE BLACK SEA WATER QUALITY FORMATION AROUND THE SOZOPOL BAY AND STRANDJA REGION

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ABSTRACT

The water volume of the Black Sea is formed by continental water, precipitations and water from the Seas of Marmora and Azov. Among the continental fresh waters the most significant are the rivers Danube, Dneper, Dnester and Buk. 70% from the all water discharge inflowing into the sea is from the Danube river catchment area. Southward the Sozopol town the rivers Ropotamo, Diavolska and Veleka rivers register some local influence on the shore water. The assessment of the Black Sea water quality is done on the base of hydrographic, geological and hydrochemical characteristics of the studied region. The geological structure of the shore part is examined, especially in the region of the mouths of the main rivers. The water quality in the shore part is estimated. The assessment is carried out according the main standard water quality parameters concerning the oxygen regime, organic pollution, mineral content (including salinity), biogenic elements.

CHARACTERISTICS OF THE REGION

The water volume of the Black Sea is formed by continental water, and water from the Seas of Marmora and Azov. Among the continental waters the most significant are the rivers Danube, Dnester and Buk. 70% from the whole water discharge that flows into the sea is formed by the Danube river. Regarding the interaction between the shore and sea waters at the Bulgarian part some quantitative idea gives the annual discharge of the Bulgarian Black sea rivers which now is about 2 km^3 yearly. More than one third of it is from the Kamchia river. The seawater inflow into the oversalted lakes is about 0,3 km^3 yearly. The seawaters that enter the limans and the mouth parts of the river basically are flowing back into the sea. The direct industrial input in the Bulgarian southern part of the Black Sea has a small quantity, but shows a certain influence of the quality of the sea water in the regions close to the river mouths. The influence of the Bulgarian shore waters to the waters of the Black Sea has a local character- mostly in the mouths of the bigger rivers and in the gulfs, because the total length of the Bulgarian seashores about 9% of the seashore of the Black sea and the water discharge from the rivers inflowing from Bulgarian territory is 0,7% from the water discharge of all Back Sea tributaries.

The salinity of the Black Sea water in this region is 17-18 $^{o}/_{oo}$. The specific hydrological regime forms two basic layers – upper (shallow) with dept of 150-180 meters, which contains the poisonous gas, which is deprived from any living organisms. The full exchange of the seawaters is performed for 590 years.

In the ecological condition of the Black Sea there are four periods, which are characterized with considerable modifications in its hydro-chemical regime.

◄ 1st period of comparatively clean sea (up to 1965)

◄ 2nd period of the gradual accumulation of the contamination of organic and inorganic origin (from 1065-1972)

◄ 3rd period of intensive eutrofication (1973-1999)

◄ 4th period of slow rehabilitation (after 1991)

CHEMICAL COMPOSITION

The information about the chemical composition of the shore waters in the Sozopol gulf and the Strangian seacoast is from the regional chemical lab of NIMH -BAS based in Burgas town. The information, which is used, is from expedition results for the period of May 1999 up to October 2002. The samples are taken from docks at about 30 m distance from the seashore and are current about the condition of the seawaters in the region.

Main ions

The main ions of which depends the level of salinity are the (Cl^-), (SO_4^{2-}), (HCO_3^-), (Na^{2+}), (Mg^{2+}), (Ca^{2+}), (K^+). The alterations of these ions concentrations for the period 1999-2002 for the months May - October are shown in the figures 1, 2, 3, 4.

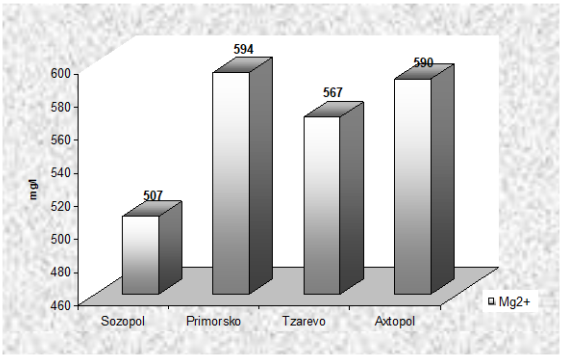

Figure 1. The alteration of concentrations of Mg^{2+} ion for the period May-October 1999–2002.

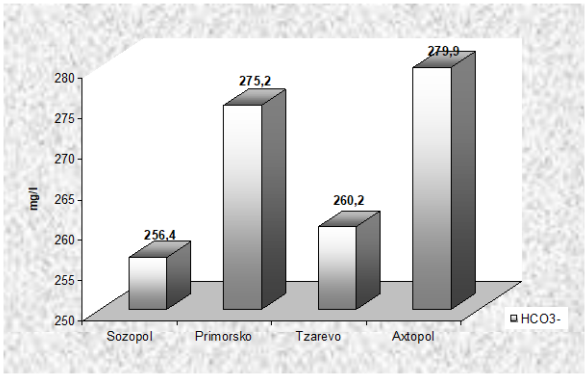

Figure 2. The alteration of concentrations of HCO_3^- ion for the period May-October 1999–2002.

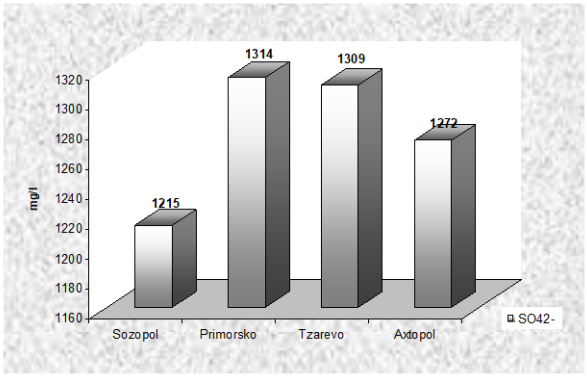

Figure 3. The alteration of concentrations of SO_4^{2-} ions for the period May-October 1999–2002.

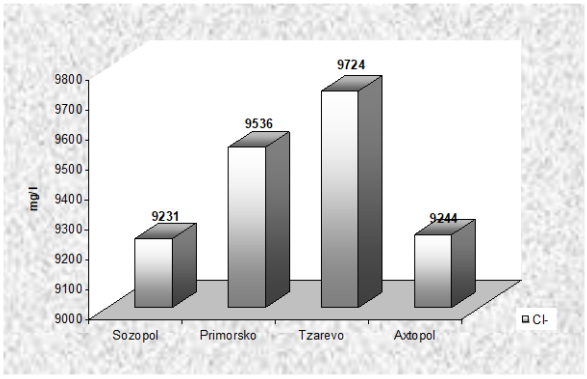

Figure 4. The alteration of concentrations of Cl- ion for the period May-October 1999–2002.

Biogenic elements

The biogenic elements are of big importance to every ecosystem. The variability of biogenic elements concentrations is shown in table 1.

Table 1. The biogenic elements concentration variability for the summer months for the period 1999-2002

Element	concentrations, mg/l	
	Max	min
NO_3	0.803	0.00
NO_2	0.800	0.00
PO_4	0.660	0.12

Indicators for the oxygen regime

Dissolved oxygen (O_2). The alteration of the concentrations of this important parameter is shown in figure 5.

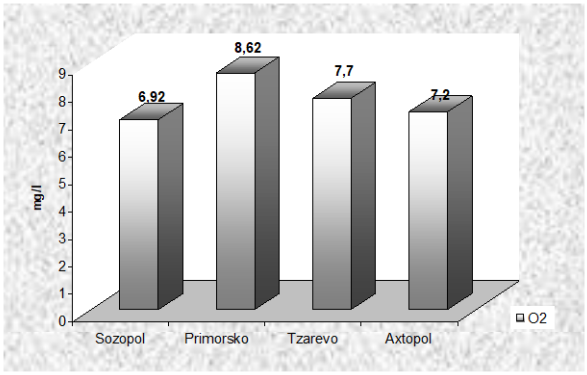

Figure 5. The alteration of concentrations of dissolved oxygen for the period May-October 1999–2002.

Oxidation. The average values of permanganate oxidation in the Sozopol gulf and the Strangian seacoast are shown in figure 6.

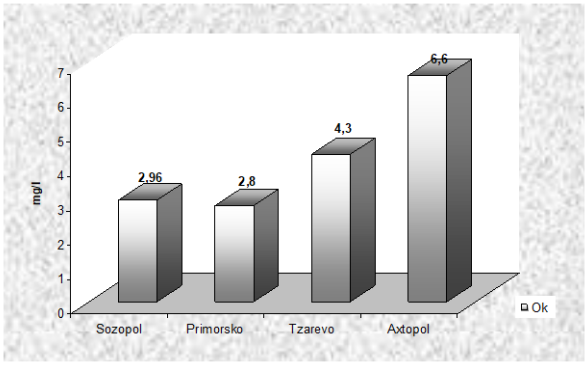

Fig. 6. The alteration of permanganate oxidation for the period May-October 1999–2002.

On the base of the gathered information for the quality of the Black sea waters to the south of Sozopol town, near Bulgarian Turkish boundary we may conclude that waters in this region are not contaminated. The rivers that flow into the sea are the Diavolska river, Ropotamo river and Veleka river. Their role in the forming the Black Sea water chemical composition is small and has a local character. It is of big importance to continue the quality control activities concerning inflowing industrial and domestic water.

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