VERTICAL HYDROCHEMICAL STRUCTURE OF THE BULGARIAN BLACK SEA PART

Anton Krastev *, Galina Shtereva , Ognyana Hristova and Boryana Dzhurova
Institute of Oceanology - BAS, Bulgaria, Varna 9000, P.O.Box 152 - chem@io-bas.bg

Abstract
The aim of the article is to improve understanding of open-sea area peculiarities of nutrient distribution in comparison with coastal waters. The data was obtained cruises during 2001-2005 period in a sampling grid along Bulgarian Black Sea coast. Physical parameters were obtained by Sea Bird CTD device. Dissolved oxygen was analysed by Winklermethod and nutrients by standard spectrophotometric methods on board. Key characteristics of vertical hydrochemical structure correspond to those already established for the Black Sea. There are differences in densities where extreme values of parameters are found in comparison to other Black Sea regions. This is due either to specific processes for the area and/or to recent changes in the state of the basin.
Keywords : Black Sea, Density, Oxygen.

Black Sea is one of the semi-enclosed seas with limited water exchange with World Ocean and significant amount of freshwater into the NW region. The western part of the Black Sea ischaracterised by considerable influence of river inputs and eutrophication due to nutrients stock [1].The aim of the article is to improve understanding of open-sea area peculiarities of nutrient distribution in comparison with coastal waters in last years. The study is based on data obtained cruises during 2001-2005 period in a sampling grid along Bulgarian Black Sea coast. Water samples were collected by rosette sampling bottles system at standard depths dawn to 300 m and pre-determined thermocline layer. Physical parameters were obtained by Sea Bird CTD device. Dissolved oxygen was analysed by Winkler method and nutrients (phosphates, nitrites, nitrates and silicates) by standard spectrophotometric methods on board [2].In summer the shallow area is characterized by homogeneity of the water column in respect of temperature, salinity and nutrients. Dissolved oxygen (DO) gradually decrease with depth [3]. The coastal marine eutrophication is significant which is demonstrated by higher nutrients content in comparison to the open sea (surface distribution).SHL: For deep stations surface homogeneous layer includes the water column from 0 to 30 m. Nutrients content is low (near zeroes) especially phosphate concentration. The measured phosphorous concentrations often are lower than detectable limit of measurement. Density varies from 10.0 to 11.8. Concentrations of dissolved oxygen are high and the layer is oversaturated. Comparison with surface homogeneous layer of the shallow stations shows higher salinity. Thermocline layer varies from 20 to 35 m. Nitrates and phosphates contents decrease and silicates have no changes from surface homogeneous layer. CIL: Cold intermediate layer varies down to 100 m. It is characterized by higher nutrient concentration due to their mineralization. Nitrites distribution is characterized by maximums over and/or nitrates maximum. Nitrate maximum is located at $\sigma_\theta \approx 15.2$.Other nutrients gradually increase down to oxic/anoxic layer. Phosphates show higher values at density about $\sigma_\theta \approx 16.0$. Increasing trend of silicates is extended in anoxic zone as well. Dissolved oxygen content of 20 μMas an upper boundary of suboxic zone is determined at $\sigma_\theta \approx 16.1$.Dissolved oxygen is undetectable under $\sigma_\theta \approx 16.5$. Density scaled oxygen saturation (OS)follows generally strictly vertical distribution of DO. The higher dispersion in thermocline layer is compensated completely in oxygen saturation profile. In contrast with the other Black Sea regions the nitrates maximum in front of the Bulgarian coast corresponds to higher values of dissolved oxygen even for a long term periods. Thus, in spite of missing investigations in relation to density we can assume a typical similar vertical distribution for the region. Phosphates content increases gradually from $\sigma_\theta \approx 14.5$ to $\sigma_\theta \approx 15.2$. The vertical profile of silicates corresponds to the expected content values as well as to its distribution. A minimum above the upper boundary of suboxic zone is observed. Key characteristics of vertical hydrochemical structure correspond to those already established for the Black Sea. There are differences in densities where extreme values of parameters are found in comparison to other Black Sea regions. This is due either to specific processes for the area and/or to recent changes in the state of the basin.

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