

CHANGES OF OXYGEN SATURATION IN THE BOTTOM LAYER OF THE MIDDLE-EASTERN ADRIATIC DURING THE PERIOD 1972-2002

G. Kušpilić *, B. Grbec, G. Beg-Paklar, M. Morović and A. Barić

Institute of Oceanography and Fisheries, 21000 Split, P.O. Box 500, Croatia - * kuspe@izor.hr

Abstract

Based on the results of regular monthly cruises in the area of the middle-eastern Adriatic a drop in oxygen saturation of the bottom layer was observed in the period 1992-1996. The decrease of oxygen content was coupled with a nutrient enrichment in this layer. This phenomenon seems to be connected with an unusual low water exchange rate between the Adriatic and the Mediterranean.

Keywords: Adriatic Sea, nutrients, oxygen saturation, time series

Introduction

The upper part of the water column (0-75 meters) in the middle-eastern Adriatic area is throughout the year characterised by moderate primary production, balanced oxygen saturation and low nutrient concentrations with relatively small seasonal oscillations. In contrast to the upper layer, the seasonal variability of nutrient and oxygen concentrations in the water column below 75 m is much higher and depends on the vertical particulate organic carbon fluxes and Levantine intermediate water (LIW) inflow. Extremes of oxygen and nutrient concentrations in this layer are usually established during late summer. As the LIW inflow seems to be controlled by a horizontal pressure difference between the mid-northern Atlantic and the south eastern Mediterranean (1), large scale interannual climatic variability could be an important factor for the hydrographic and chemical properties of deep water layers.

Material and methods

Hydrographic and chemical data collected in the period 1972-2002 from a station in the middle Adriatic Sea (43°00.0' N, 16° 20.0' E) were analysed. Temperature and salinity were obtained by reversing thermometers, salinometers and CTD probes, whereas nutrients were measured on different Technicon AutoAnalysers (I, II and III) and oxygen by the classical Winkler titration.

Results and discussion

Data analysis of the basic hydrographic and chemical parameters has shown a pronounced decrease of oxygen saturation as well as an increase of nutrient concentrations in the bottom layer during the period 1992-1996 (Fig. 1). In contrast to the bottom layer no significant changes of chemical parameters and primary production in the euphotic zone were observed. The absence of the relation between primary production and bottom oxygen content points to circulation induced changes of chemical properties. In the period 1987-1995 the thermohaline structure in the Adriatic has shown a decreasing temperature and salinity trend in the intermediate and bottom layer. These trends agree with observed changes of general thermohaline Mediterranean circulation (2) indicating lower rates of LIW (saltier and warmer) inflow to the Adriatic and Adriatic bottom water outflow. Observed changes of chemical parameters seem to be the result of the remineralisation of autochthonous organic matter (probably from the productive area of the northern Adriatic) and a certain stagnation of the bottom water in the area of south and middle Adriatic.

Conclusion

Observed changes of oxygen saturation and nutrient concentrations in the bottom layer of the middle Adriatic was found to be in relation with changes of thermohaline and dynamic properties in this layer.

References

- 1 - Grbec B., Morović M., and Zore-Armanda M., 2003. Mediterranean Oscillation and its relationship to salinity fluctuation in the Adriatic Sea. *Acta Adriat.*, 44 (1): 61-76.
- 2 - Stratford K., and Haines K., 2002. Modelling changes in Mediterranean thermohaline circulation 1987-1995. *J. Mar. Syst.*, 33-34: 51-62.

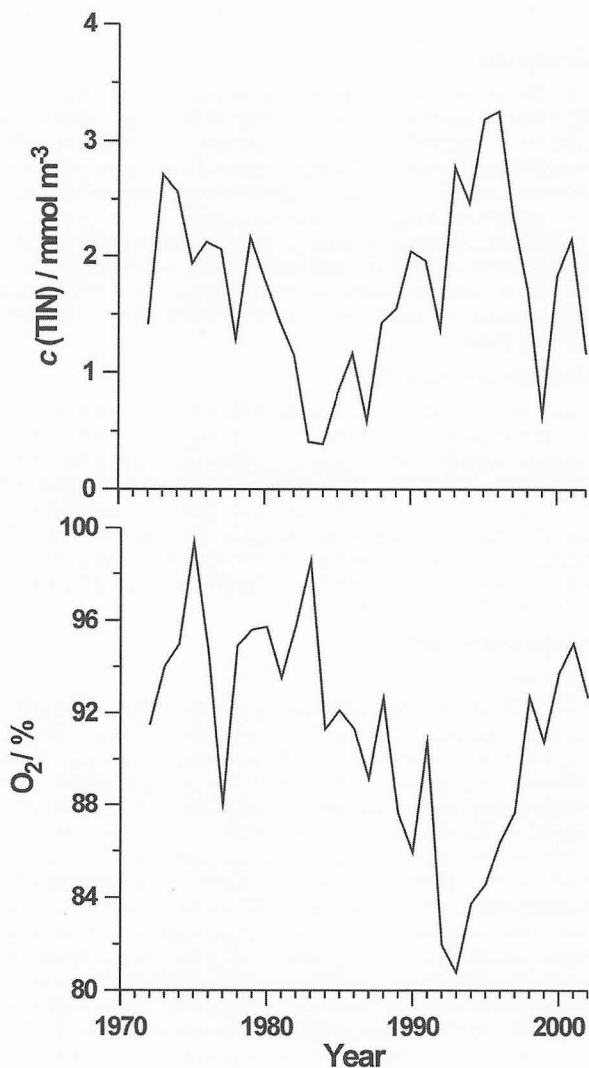


Fig.1. Yearly means of oxygen saturation and dissolved inorganic nitrogen concentrations in the bottom layer during 1972-2002.