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Some results of the transadriatic oceanographic cruises with R/V "Andrija Mohorovicic" in April 1987

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As usually, the Adriatic, as an inland sea, essentialy depends on hydrometeorologic and dynamic properties of the basin.

These properties, during the spring cruise of 1987 were once more specific and are reflected on its oceanographical (physical, chemical and biological) parameters.

Especially, untill now unusual phenomena were first time registred in the euphotic zone of the Southern Adriatic.

Explanations and results of these more recent oceanographic researches will be given and analysed.

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Changes of UV-hydrolizable Phosphorus and Nitrogen in the Northern Adriatic Sea

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INTRODUCTION

The Adriatic Sea is, as the whole Mediterranean Sea poor in nutrients. However, the northern Adriatic is one of the most productive areas of the Mediterranean. This area receives highly polluted discharges from the Po River (mean flow rate 1500 m^3/s), which supports blooms in the open waters in spite of the generally low concentrations of orthophosphate and inorganic nitrogen in the region. However, it was observed that not only orthophosphate, but also organic phosphorus shows significant seasonal changes due to basic biological cycle. It can be supposed that the same occur also for organic nitrogen. So, for better characterization of trophic level of this area distribution of total phosphorus and total nitrogen were studied, since they can be important sources of these elements for primary producers.

MATERIALS AND METHODS

Measurements were carried out at six stations in the central part of the northern Adriatic Sea during 23 cruises performed in the period from 1980 to 1984. Samples for total phosphorus and nitrogen were collected from at least four depths and stored in polyethylene bottles at -30 °C until analysis. Determinations were carried out a few days after collection in unfiltered water after oxidation of organic matter by UV-irradiation (250 nm). Basic physical, chemical and biological parameters were determined immediately after collection.

RESULTS AND DISCUSSION

The measured parameters in the northern Adriatic Sea have significant spatial and temporal variation. At the western part of this area salinity values in the surface layer falls up to $30 \cdot 10^3$, and concentrations of total phosphorus and total nitrogen up to 1.3 µmol/l and 30 µmol/l, respectively, could be reached (Table 1). These waters with higher nutrient content can support higher primary production, resulting in oxygen oversaturation in this layer. In the bottom layer oxygen concentration far bellow saturation were found, as results of intensive decomposition of organic mater and accumulation of nutrients. Generally, the concentration of total phosphorus and total nitrogen in this area were significantly higher of those measured at the eastern part of the northern Adriatic Sea (Table 1). In the surface and bottom layer most of the measured values for total phosphorus and total nitrogen (more than 80%) were grouped in interval from 0.05 to 0.25 µmol/l and 1 to 10 µmol/l, respectively, which was nearly two times larger of those obtained for the eastern part. However, their concentrations in intermediate layer were significantly lower, and did not differ from those measured in eastern part (Table 1).

Table 1. Mean values ($\bar{x}$) and ranges (R) of total phosphorus (TP) and nitrogen (TN) and contribution of organic phosphorus ($cont_{oP}$) and organic nitrogen ($cont_{oN}$) in surface (S), intermediate (I) and bottom (B) layer of the northern Adriatic Sea.

PARAMETERS	layer	EASTERN PART n	$\bar{x}$	R	WESTERN PART n	x	R
	S	63	0.16	0.03-0.48	63	0.32	0.03-1.33
TP	I	81	0.12	0.04-0.25	80	0.18	0.04-0.43
µmol/l	B	62	0.18	0.03-0.45	61	0.36	0.07-1.13
	S	63	76	33-100	63	64	0- 94
$cont_{oP}$	I	80	73	25-100	81	63	0-100
%	B	60	64	16- 91	60	42	6- 81
	S	68	4.5	1.7-10.4	63	6.7	1.9-29.6
TN	I	85	4.2	1.1-14.8	81	4.4	1.2- 8.6
µmol/l	B	67	4.5	1.6- 9.4	58	5.6	1.7-14.5
	S	63	66	14-95	63	67	4-93
$cont_{oN}$	I	81	70	26-98	79	64	0-95
%	B	61	61	28-88	53	49	0-82

In the upper layer prevailed organic fractions of phosphorus and nitrogen (over 60% in average), due to intensive primary production. In bottom layer regenerative processes led to predominance of their inorganic fractions (Table 1). At the eastern part the changes of parameter values were lower. In this area with elevated salinity values, nutrient concentrations were lower and dissolved oxygen near saturation level in whole water column. The concentration of total phosphorus and total nitrogen were almost uniform in whole water column (Table 1), and usually did not exceed (less than 20% of measured values) 0.25 and 6 µmol/l, respectively. Organic fraction of phosphorus and nitrogen prevailed in whole water column accounting for more than 60% (in average) in their total content.

The distribution of total phosphorus and nitrogen in the northern Adriatic Sea shows that a significant concentration gradients were established in the region. The higher concentration found at the western part are due to nutrient apport from the land, mainly from polluted Po River whose water can spread far away from the coast. The concentration measured at the eastern part are similar as those found for central and southern Adriatic (CNR; unpublished data), suggesting that this area is influenced by oligotrophic waters from the central Adriatic areas.