IODINE SPECIATION IN THE WATER COLUMN OF THE ROGOZNICA LAKE (EASTERN ADRIATIC COAST)

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Iodine occurs in sea water predominantly as iodate and iodide, although some quantities of organic iodine may also be present. Total iodine concentration in sea water is approximately 500 nM. The calculated concentation ratio of iodate to iodide under redox equilibrium conditions (pH = 8.1, p_{O2} = 0.21) is $10^{13.5}$, and it is assumed to be controlled by O_2/H_2O couple which strongly favoures iodate. Measurable concentrations of iodide and nutrient-like behavior of iodine suggest that biological and photochemical processes may promote a reduced form of iodine (LUTHER and WU, 1992).

Due to redox sensitive and biophillic nature of iodine it is of special interest to study the distribution of iodide, iodate and organically bound iodine in the water column of a basin where both oxic and anoxic conditions occur (LUTHER and CAMPBELL, 1991; LUTHER *et al.*, 1991). Such conditions have been found in the Rogoznica lake (Dragon's eye). It is a small, salt lake, surrounded with vertical carbonate rocks. The existance of mediolittoral zone suggest the connection between the lake and nearby sea. Due to oxygen content the water column of the lake can be devided into the upper oxic and the lower anoxic zone, during the stratification period (April-October).

To ascertain the depth and seasonal variations in speciation of iodine, samples were colected in September and November 1993, and April 1994. Temperature, salinity and oxygen content were determined immediately after collection. Iodide has been determined directly in water samples by cathodic stripping sqare wave voltammetry. Differential pulse voltammetry has been used to determine iodate, total iodine (by hypoclorite oxidation of the lake water sample to iodate) and indirectly organo-iodine (by UV irradiation followed by hypoclorite treatment).

	September, 1993			November, 1993			April, 1994		
Depth	O_2/mgl^{-1}	S/‰	t/oC	O_2/mgl^{-1}	S/‰	t/°C	O_2/mgl^{-1}	S/‰	t/°C
0.5	6.62	33	23.9	7.97	37	17.8	8.95	27	15
2.0	6.63	36	23.1	8.46	37	17.6	8.48	27	15
5.0	5.36	36.5	22.9	4.89	39	19.2	7.69	35.5	17
7.0	4.46	37	22.9	4.62	40	19.5	4.12	38	19
8.0	4.38	38	22.9	4.46	39	19.5	2.96	38	19
8.5	4.32	38	22.9	4.09	40	19.5	3.93	39	19
9.	4.22	38	22.7	4.19	40	19.5	1.09	39	19
9.5	3.77	38	22.7	3.99	40	19.5	0.07	39	19
10.0	2.71	38	22.6	3.62	40	19.5	0.09	39	19
10.5	3.74	38	22.6	3.73	39.5	19.5	ND	39	19
11.0	2.52	38	22.5	3.02	38	19.5	ND	39.5	18
12.0	ND	38	22.5	1.45	40	19.5	ND	39.5	18

Table 1. Salinity, temperature and oxygen content from the Rogoznica Lake, September and November 1993. and April 1994.

The depth of the oxic-anoxic interface varies upon the season and strongly affects the vertical distribution of iodine species. Iodate concentrations in the upper layers are similar to those observed in sea water. Only reduced forms of iodine are found to be present in the bottom layers. The difference between the total iodine and the sum of iodide and iodate was significant in April and can be attributed to organic compounds which can react with hypochlorite. No difference was found in November The contribution of other organo-iodine species (determined as species decomposed by UV-irradiation) was also the lowest in November, and can be connected with negligible biological activity during this period of year.

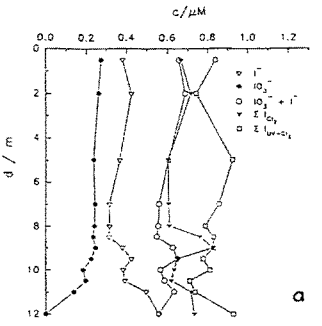
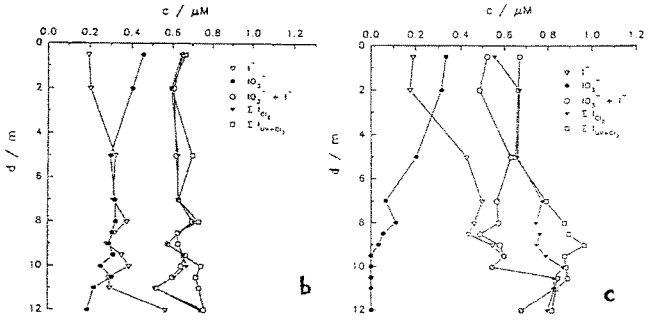


Figure 1. Vertical distribution of iodine species in the Rogoznica Lake a) September 1993. b) November 1993. c) April 1994.



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