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Biogeochemical cycling in organic rich sediment of two lakes in Tunisia

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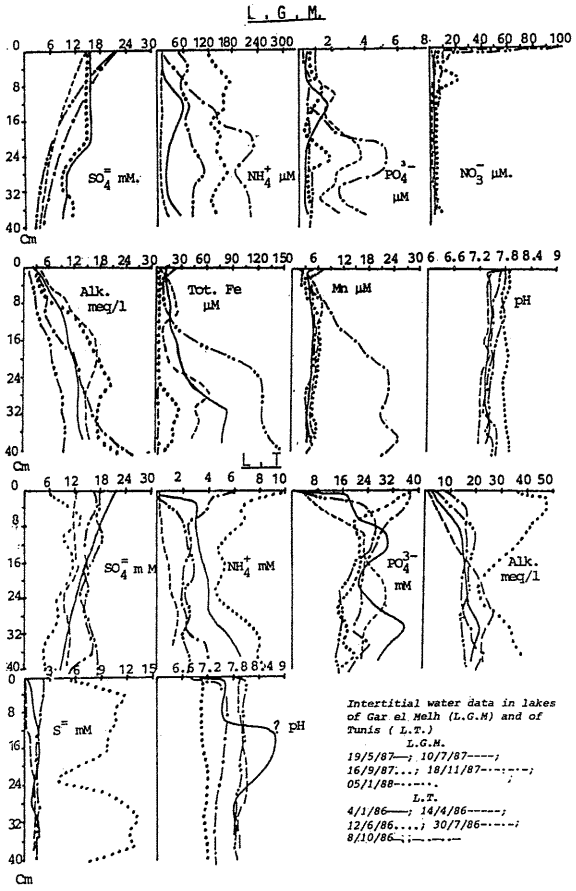
The lake of Tunis and the lake of Garel Melh are situated in the north of Tunisia. They communicate with the opensea and have salinity which can exceed 40‰ in summer. Tunis lake's sediment consist of silty mud rich in organic matter(4% of organic carbon) and sulfide(0,7‰dry sediment; HCl soluble sulfide). The porosity of the sediment is high. Sediment from Gar el Melh is composed mainly of mud where the rate of organic carbon and sulfide are about 0,2% and 1‰respectively.The porosity here is less important than in Tunis lake. Carbonate content varies between 20-40% in Gar el Melh and between 25-60% in Tunis. In both lakes, the rate of organic matter varies seasonally and the water depth never exceeds two meters. The two types of sediment are anoxic, where oxydation of organic matter is mainly conducted by sulfato-reduction bacteria. Bacterial activity is influenced by temperature which varies between 18-28c.

Analysis of sulfate, ammonium, nitrate,phosphate, alkalinity, Ph, sulfide, and metals, in the interstitial waters during1986 in the lake of Tunis and 1987 in the lake of Gar el Melh, allow us to understand the behaviour of these elements and to evaluate their influences on free waters. The concentrations of elements (see curves) varie with time because of variations of bacterial activity and because of influences of waves and currents on sediment. Waves and currents are very significant in the lake of Tunis because of the great porosity of the sediment. They are cleaning agents of the sediment. In the absence of waves and currents and during summer, bacterial activity increases consequently the concentrations of sulfide, ammonium and phosphate increase in the interstitial waters.So fluxes by molecular diffusion are established and make anoxic the free waters. This is the case especially in the lake of Tunis. Besides bacterial activity and waves and currents, precipitation/dissolution seem to control the concentrations of the elements. For example, in the lake of Gar el Melh, monosulfides like mackinawite and greigite, siderite, and vivianite control iron and phosphate in interstitial waters. Mathematic modelisations based on the equation of diffusion and treated in no stationarry system are done for ammonium in the lake of Tunis*. In this model, the coefficient of diffusion was supposed not to change with time. This assumption is unreasonnable and induces errors in the calculations of the rate of production of this element. Modelisations tacking into account physical processes are in course.



* A. ADDED; R. BARATIE; F. FERNEX : modelisation non stationnaire des echanges a l'interface eau-sediment dans le lac de Tunis.8 th IAS Regional Meeting of Sedimentology. Tunis 1987.

C-II9

On the chemical composition of the Black Sea water along the Romanian coast in October 1987

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Résumé. L'eau de mer échantillonnée sur la plateforme continentale roumaine de la mer Noire, a été analysée pour les macro et microéléments en appliquant des méthodes chimiques et d'analyse par activation neutronique instrumentale. Les zones correspondent à celles où ont été effectués des prélèvements de Moules Mytilus G., pour l'étude de la pollution, en octobre 1987.

Introduction. The aim of this paper was to carry out a general investigation on the macro and microelements dissolved in the offshore Black Sea water that is not under directly influence of the terrestrial human activities and to explain the behaviour of selected man made and natural radionuclides, found in *Mythilus G.* sampled on the same sites [1]. *Material and Methods.* Seawater sampled at Sulina (37 km. East, 7 km. South, Serpents Island), Portitza (7.3 km. East) and Mangalia (7 km. East) in the beginning of October 1987, after a storm of 5 degree, has been analysed making use of analytical spectrophotometric and instrumental neutron activation methods. The results are included in Table 1 for macro ions,in Table 2 are other characteristics and in Table 3 are the elements found by instrumental neutron activation analysis.

TABLE 1 - Macro-ions mg/ℓ in Black Sea water in October 1987

Location	Na^+	K^+	Mg^{++}	Ca^{++}	Cl^-	SO_4^{--}	HCO_3^-
Sulina 8-X-1987	5687.7	151.1	875.5	285.5	9210.6	3456.0	256.2
Portitza 6-X-1987	5224.5	142.1	719.8	248.4	9219.6	1824.0	268.4
Mangalia 13.X-1987	5402.0	141.1	688.2	226.4	8865.0	2496.0	268.4

TABLE 2

Location	org.subst. mg/ℓ	H_2SiO_3 mg/ℓ	Tot.hardn. mg/ℓ	Fixed resid. at 105°C mg/ℓ	Total miner. mg/ℓ
Portitza	12.5	5.1	200.5	17515.1	17649.7
Sulina	14	Traces	237.6	19781.3	19909.0
Mangalia	12.5	Traces	190.1	17955.2	18089.5

NH_4^+, NO_2^-, NO_3^-, HBO_2 were lack in all the samples.

TABLE 3 - Macro and microelements concentration of Black Sea surface water (October 1987)

Concentration		Sulina	Portitza	Mangalia
Cl	%	46.80±1.64	60.04±1.76	46.48±1.63
	g/ℓ	9.2 ±0.3	10.2 ±0.3	7.9 ±0.3
Na	%	23.52±0.59	29.92±0.75	24.16±0.60
	g/ℓ	4.6 ±0.1	5.1 ±0.1	4.1 ±0.1
Mg	%	3.82±0.76	3.60±0.78	2.62±0.63
	g/ℓ	0.75±0.15	0.61±0.13	0.45±0.11
Ca	%	0.87±0.13	0.24±0.07	0.71±0.11
	g/ℓ	0.17±0.03	0.04±0.01	0.12±0.02
Br	ppm	2020±120	2213±130	1500±90
	mg/ℓ	39.5±2.3	37.7±2.2	25.6±1.5
Sr	ppm	289 ± 25	74 ± 14	247±25
	mg/ℓ	5.6 ±0.5	1.3±0.2	4.2±0.4
Fe	ppm	< 36	76±19	42±15
	mg/ℓ	< 0.70	1.3±0.3	0.7±0.3
Zn	ppm	11 ± 1	4.4±0.6	3.2±0.5
	µg/ℓ	215 ± 20	75±10	55±8
Cr	ppm	< 0.9	< 1.2	< 1.1
	µg/ℓ	<18	<20	<19
Sb	ppm	0.5 ±0.1	5.5±0.5	17 ±0.2
	µg/ℓ	10 ±2	94±9	29 ± 3
Sm	ppm	0.21±0.04	0.19±0.07	0.15±0.06
	µg/ℓ	4.1 ±0.8	3.2±1.2	2.6 ±1.0

References

1. **Salagean**, M., **Pantelica**,A., and Georgescu,I.I.-1988 - On the neutron activation analysis of *Mytilus Galloprovincialis*, sampled during 1987 on the Romanian shore. The XXXIst Congress I.C.S.E.M. 17-22 Oct.1988 Athenes (Greece).