NUTRIENT DISTRIBUTION IN THE MEDITERRANEAN COAST OF TURKEY

Asli Kaymakçi Başaran * and Özdemir Egemen
Ege University, Faculty of Fisheries, Dept.of Hydrobiology, 35100 Bornova-Izmir, Türkiye - asli.basaran@ege.edu.tr

Abstract
In this study, seawater samples were collected during September 2005 at 50 points in the eastern and western part of Mediterranean coast of Turkey and analyzed for nutrients, temperature and salinity. The concentrations of nutrient changed between nd-1.60μg/L for NO_2-N; nd-7.95 μg/L for NO_3-N; nd- 25.93μg/L for NH_4-N; nd-4.68 μg/L for PO_4-P; and 0.42-91.09μg/L for Reactive Si. The results are compared with data obtained from previous studies.
Keywords : Eastern Mediterranean, Pollution.

Introduction
The coastal zone of the Mediterranean Sea is of considerable socio-economic importance for Turkey, since it supports large scale tourism, fishing and port activities. Discharge of industrial, agricultural and domestic activities, which are the main sources of nutrients, flow to the Mediterranean Sea. Terrestrial phosphate input into the Mediterranean Sea has been increasing considerably since 1960 [1]. The eastern Mediterranean including Turkish coasts has oligotrophic conditions due to the lack of freshwater input and physical characteristics of water masses [2]. The objective of this study is to determine the nutrient distributions in the Mediterranean coast of Turkey. The results are also compared with the previous studies.

Material and Methods
The study (within the framework of the Project 104Y065 supported by TÜBITAK) was carried out at 50 stations during one month period between 12 September - 7 October 2005. Map of sampling locations are given in Figure1.

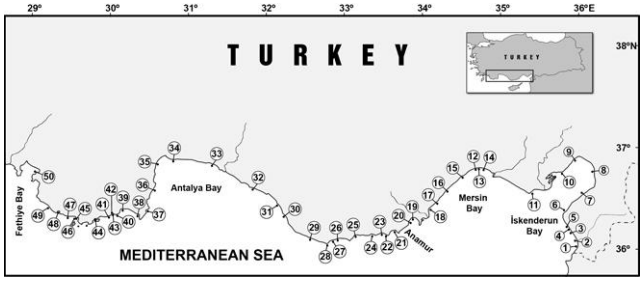

Fig. 1. Map of sampling stations

Surface water temperature and salinity were measured during the sampling cruise with a SCT meter (YSI model). Water samples for nutrient determinations were collected at surface waters in 1000ml polyethylene bottles and then immediately frozen. Samples were kept continuously in deep freeze (-20 °C) until analysis. Sample analyses were generally carried out within one week of the completion of the cruise. Nutrients were measured spectrophotometrically [3].

Results and Discussion
Nutrient distribution is associated with physico-chemical dynamics (temperature, salinity, etc.) of the sea. In this study, the sea surface temperature ranged from 21.4°C to 31.4°C in September. The salinity changed between 13.3-39.4 ppt; low salinities are observed near freshwater input (Station 39). Table 1 summarizes the nitrate, nitrite, ammonium nitrogen, phosphate phosphorus, reac. silicate, salinity and temperature data for the 50 stations all of which the water depth is approximately between 1 and 2 meters. Mean values with the standard error and previous studies are given.
Nutrients (especially nitrite, ammonium, phosphate) concentrations are extremely high at station 15 in the Mersin Bay where the fertilizer, chemistry textile industrial wastes are discharged. Maximum peak in silicate and nitrate concentration took place at station 39 located in Beymelek Lagoon in Antalya owing to the freshwater input. Dissolved inorganic nutrients were generally low in Northeastern Mediterranean Sea [4, 5, 6] . Especially phosphate phosphorus, found below or near detection limit, is considered to be the limiting nutrient in Mediterranean Sea [7].

Tab. 1. Minimum, maximum and mean values together standard error of physico-chemical characteristics and nutrients in Mediterranean coast of Turkey and previous study (range values)

Variables	Min.	Max.	Mean±SE	Northeastern Mediterranean [4]	Iskenderun Bay [5]	Cilician Basin [6]
Temperature (°C)	21.4	31.0	27.09±0.28	-	15.9-29.0	-
Salinity (ppt)	13.3	39.4	37.34±0.68		38.0-39.2	-
NO_2-N (µgat/L)	nd	1.60	0.16±0.03		-	-
NO_3-N (µgat/L)	nd	7.95	0.86±0.22	0.05-6.0	0.31-1.63	0.16-0.31
NH_4-N(µgat/L)	nd	25.93	1.33±0.52		-	-
PO_4-P (µgat/L)	nd	4.68	0.42±0.15	0.01-0.24	0.08-0.60	0.02-0.03
Reac.Si (µgat/L)	0.42	91.09	10.97±2.16	1.0-11.0	0.5-2.7	0.95-1.2

In conclusion, although the land-based activities (agriculture, industry, tourism) on the Mediterranean region of Turkey has brought increased phosphate and nitrate inputs to the Mediterranean Sea, this coast is not eutrophicated due to the physical characteristics related to the different water masses.

References

1 - Karafistan A., Martin, J.M., Rixen, M., Beckers, J.M., 2002. Space and time distributions of phosphate in the Mediterranean Sea. *Deep-Sea Research I* 49: 67-82.
2 - Yilmaz, A., Baştürk, Ö., Saydam, C., Ediger, D., Yilmaz, K., Hatipoğlu, E., 1992. Eutrophication in Iskenderun Bay, northeastern Mediterranean. Sci. Total Environment , Supplement: 705-717.
3 - Strickland, J.D.H., Parsons, T.R., 1972. A Practical Handbook of Seawater Analysis. 2^{nd}ed. Bulletin 167. Fisheries Research Board of Canada, Ottowa, 310 p.
4 - Salihoğlu, I., Saydam, C., Baştürk, Ö., Yilmaz, K., Göçmen D., Hatipoğlu, E., Yilmaz, A., 1990. Transport and Distribution of Nutrients and chlorophyll a by Mesoscale eddies in Northeastern Mediterranean. *Mar. Chem.,* 29:375-390.
5 - Polat, S., 2002. Nutrients, chlorophylla and Phytoplankton in the Iskenderun Bay (Northeastern Mediterranean). *Marine Ecology,* 23 (2): 115-126.
6 - Küçüksezgin, F., Pazi, I., 2006. Circulation, hydrographic and nutrient characteristics of the Cilician Basin, Northeastern Mediterranean Sea. *Journal of Marine Systems*, 59: 189-200.
7 - Yilmaz, A., 2002. Bogeochemisty of the seas Surrounding Turkey: Cycling and Distributions. *Turkish J. Eng. Env. Sci.* 26: 219-235.