PHYSICAL AND CHEMICAL PROPERTIES OF THE CILICIAN BASIN, NORTHEASTERN MEDITERRANEAN SEA

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Abstract
The water mass and chemical properties of the Cilician Basin, the northeastern Levantine Sea, are described on the basis of three hydrographic cruises. The hydrographic data reveal the presence of Levantine Surface Water (LSW) and Atlantic Water (AW) within the upper 90 m layers, Levantine Intermediate Water (LIW) between 90 and 250 m, and Transitional Mediterranean Water (TMW) further below.
Keywords : Eastern Mediterranean, Hydrography, Phosphorus.

Introduction
While the general features of the hydrology of the Eastern Mediterranean are fairly well recognized [1, 2] a consistent representation of their characteristics in the Cilician Basin is still lacking. Although the nutrient regime of the eastern Mediterranean has been studied extensively in recent years [3, 4] the physical, chemical and biological data are too limited to reach reliable conclusions about the spatial and temporal variability of water masses in the Cilician Basin. We present here data from three cruises that can provide an exhaustive description of water mass properties and nutrient charecteristics in the Cilician Basin.

Materials and Methods
The investigation was restricted to an area 180 by 80 km on the northern Levantine part of the Eastern Mediterranean. The data were collected as part of three cruises of the R/V K. Piri Reis in May 1997 (spring), July 1998 (summer) and October 2003 (fall). During each cruise, standard CTD profiles were obtained at each station using a SBE-9 CTD, equipped with pressure, temperature and conductivity sensors. Water samples were collected from discrete depths using a General Oceanics Rosette sampler attached to the CTD. Nutrient analysis were carried out according to Strickland and Parsons [5].

Results and Discussion
The composite depth profiles of potential temperature, salinity and σ_θ in the Cilician Basin display an apparent seasonality. In spring, the surface mixed layer was separated from the deep water by a strong halocline at 25-50 m. Below the surface mixed layer, the LIW extends to 200-250 m. During spring the water of Atlantic origin (AW) is hardly discernible as a subsurface salinity minimum, probably due to mixing processes. In summer, the seasonal thermohaline, formed below the mixed surface layer, appears at a depth of 50-75 m. In fall, the thermocline moved downward to 75-100 m and the surface layer was saltier and cooler than in summer. During summer and fall the surface layer was separated from the less saline AW by a strong halocline. The AW layer was occupied by less saline and warmer waters between 30 and 80 m than LIW between 90 and 200 m. Combined data concluded that the water properties below 300 m were T=14°C, S=38.7-38.8 and σ_θ =29.2 kg/m^3(Table 1).

Tab. 1. Water masses characteristics in the Cilician Basin.

DATE		LSW	AW	LIW	TMW
May 1997	θ (°C)	19-22	-	16	14
	S	39.2	-	39.2	38.8
	σ_θ (kg/m^3)	27.6	-	28.9	29.2
July 1998	θ (°C)	26-28	18	16	14
	S	39.2-39.4	38.9	39.15	38.8
	σ_θ (kg/m^3)	25.5-26	28.3	28.9	29.2
October 2003	θ (°C)	24-26	18	17	14
	S	39.3-39.6	38.7	39.1	38.7
	σ_θ (kg/m^3)	26.2-27.0	27.8	28.8	29.2

The surface waters of the Cilician Basin are poor in nutrients for most of the year compared to other areas of the Levantine Basin. The depth-averaged values for the surface layer were 0.3 μM for nitrate+nitrite and 0.03 μM for phosphate in May 1997 and July 1998. In October 2003, the upper layer was even poorer in nutrients (NO_3+NO_2=0.16 μM, PO_4=0.02 μM). The silicate values always remain near to 1 μM in the surface layer throughout the year. Concentrations in the TMW were recorded as 3.3 μM for nitrate, 0.14 μM for phosphate and 6.8 μM for reactive silicate in May 1997. During the July 1998 cruise, dissolved nutrient concentrations in the TMW (at a depth of 300 m) were 2.1, 0.10 and 5.7 μM for nitrate, phosphate and silicate, respectively. In October 2003, the nutrient concentrations of TMW increased (NO_3+NO_2= 5.3 μM, PO_4= 0.21 μM, $Si(OH)_4$=10 μM).

Conclusion
The synthesis of the three datasets revealed some new features. The LSW, which is indicated by a seasonal trend, has high salinity and high temperature as a result of the high rates of heating and evaporation. The AW appeared to be poorly defined during spring however it became better defined in summer and fall. There appeared to be no seasonal variations in the LIW and TMW. The nutriclines appear at specific density surfaces throughout the Cilician Basin even though their depths vary markedly in space and time. As nutrient deep concentration is greater than Levantine surface concentration, vertical movements in the Cilician Basin induce nitrogen enrichment of the deep layer.

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