PHYTOPLANKTON AND OCEANOGRAPHIC CONDITIONS IN THE STRAIT OF OTRANTO (EASTERN MEDITERRANEAN)

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The Strait of Otranto is the connection between the Adriatic and Ionian Seas. The present knowledge of biological characteristics in the Strait is poor. Other natural characteristics relate mainly to water circulation and thermohaline characteristics.

Water samples (5 l Niskin bottles at 0.5, 5, 10, 20, 50, 75, 100 and 200 m) were collected during five spring-summer case studies (March 1990, April 1987, May 1990, July 1989, August 1986), with the RV "Andrija Mohorovicic", from two stations located across the Strait : the western station 4 and the eastern station 2 (Fig. 1). T-S characteristics were determined with TCD probe. Current measurements were performed in March and May 1990. Maximum thermic gradient of 0.35°C m^{-1} was found along the thermocline in the 10-30 m layer in July and August. Surface salinity values were lower in summer than in spring. Concentrations <0.2 μmol l^{-1} PO4, <2 μmol l^{-1} NO_3, <0.17 μg chl. *a* l^{-1}, 15-36 m Secchi disc visibility, reflect an oligotrophic character of the area (Tab. 1). The most abundant microphytoplankton (MICRO) species were diatoms (7 1 determined species). Dinoflagellates provided high species diversity (73 species), but low population density (mostly ≤10 cells l^{-1}). Diatoms (mostly small cell sized populations) dominated in the total MICRO abundance (43-99%). Relatively higher percentages of coccolithophorids, dinoflagellates and >3000 μm^3 cell-1 diatom fraction were recorded in August 1986. Subsurface chlorophyll maxima were found in the 50-100 m layer. Size fraction <20 µm dominated total phytoplankton biomass. In April and May subsurface accumulation of MICRO cells were also determined (Fig. 1). In summer the reduced MICRO densities are the result of the depletion of nitrate concentrations.

The eastern part of the Strait is mostly influenced by the northerly inflowing current from the Ionian Sea and the western part by the southerly outflowing current from the Adriatic Sea (typical circulation). The most intensive currents were usually recorded between 200 and 500 m with velocities of up to 64 cm sec^{-1}. Slower inflowing/outflowing currents (2-49 cm sec^{-1}) were recorded in the 0-100 m layer. Temperature and salinity values were generally lower, while abundance of MICRO and dinoflagellates higher at the western station 4, indicating southerly outflowing current there. An typical circulation could be disturbed by meteorological factors. Phytoplankton distribution was influenced by currents and complex hydrodynamic conditions. In April and May, differences in east-west distribution of thermohaline characteristics and phytoplankton were significant but due to atypical circulation in the Strait. In April 1987, this might be explained by the occurrence of the cyclonic eddy in the Strait, as have been observed from the satellite images (ARTEGIANI *et al.*, 1993), and stronger inflow of modified Levantine intermediate water into the Adriatic Sea. In May 1990, inertial oscillations in the current field were generated by the strong oscillating wind, resulting in denser phytoplankton population at the eastern station.

Thermal satellite imagery has revealed a greater horizontal thermal gradient across the Strait in winter than in summer (ORLIC *et al.*, 1992). In winter and early spring, stronger currents and east-west gradient of analyzed parameters may be expected.

	Station 4			Station 2		
	min.	max.	mean	min.	max.	mean
Temperature (°C)	13.58	26.30	16.30	13.89	26.36	16.36
Salinity (‰)	37.73	38.97	38.59	37.90	39.04	38.65
Density (σt)	25.03	29.26	28.39	25.15	29.29	28.44
Secchi (m)	15	30	22	16	36	24-
PO4 (µmol l^{-1})	0.03	0.85	0.21	0.01	0.78	0.14
NO3 (µmol l^{-1})	0.07	6.68	2.04	0.04	6.85	2.29
SiO4 (µmol l^{-1})	0.06	905	3.37	0.08	7.36	2.52
Chl. *a* - total (µg l^{-1})	0.01	0.13	0.05	0.01	0.17	0.05
Chl. *a* <20 µm (µg l^{-1})	0.01	0.13	0.04	0.01	0.12	0.03
MICRO (cells l^{-1})	$1.4x10^3$	$7.1x10^5$	$1.1x10^5$	$1.4x10^3$	$2.2x10^5$	$6.0x10^4$
BACI μm^3 $cell^{-1}$	1543	158491	22222	1214	55766	9040

Table 1. Minimum (min.), maximum (max.) and mean values of analyzed parameters in the Strait of Otranto. Data for March 1990, April 1987, May 1990, July 1989 and August 1986; 0-200 m layer.

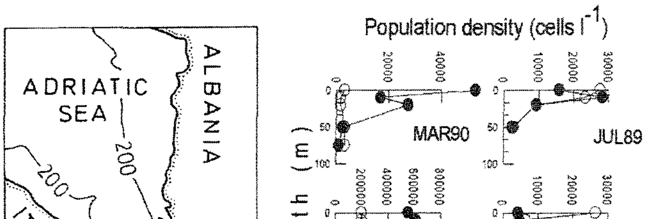

Fig. 1. Map of stations in the Otranto Strait and distribution of microphytoplankton across the Strait during five case studies (note different x-axis labels)

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STRONG VARIABILITY OF BATHYPELAGIC ZOOPLANKTON AT A SITE IN THE LEVANTINE SEA - A SIGNAL OF SEASONALITY IN A LOW-LATITUDE DEEP-SEA?

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In January 1987 and June 1993, directly comparable data sets of zooplankton were obtained from stratified oblique tows with a 1 m^2 Mocness above a 4250 m deep trough SE of Crete (34°20'N, 26°00'E). The device equipped with nine black nets of 0.333 mm mesh size was towed at a speed of about 2 knots, commencing about 100 m from the seabed. Zooplankton was defined arbitrarily to be smaller than 5 mm.

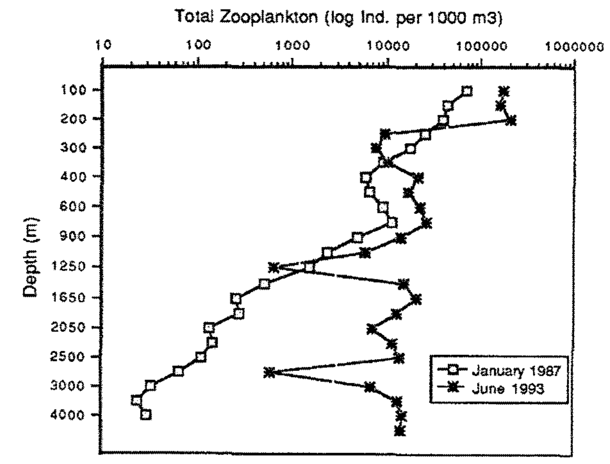
The standing crop of zooplankton was significantly higher in June (summer) than in January (winter) 1987 (Table). As examplified by one profile, the respective increase had occurred throughout the water column, but it was especially high below 1050 m, i.e. in the bathypelagic zone, as compared to shallower layers. This disproportional increase was coupled with rather constant concentrations at depth. This sort of profile contrasts to the well-known bathymetrical decrease of zooplankton at intermediate and low latitudes that was also observed at the Levantine site in January 1987 (Figure).

Overall, copepods contributed 90% to the zooplankton at both seasons. In June 1993 two calanoid species, *Calanus helgolandicus* and *Eucalanus monachus*, comprised almost 54 and 49% of the standing crops of copepods and total zooplankton, respectively (Table). Their highest absolute and relative concentrations were encountered below 600 m, and as deep as 4000 m. In this range, both species accounted for some 70% of the total zooplankton. In January 1987, *C. helgolandicus* was completely absent, and *E. monachus* constituted only 20% of the copepods and the total zooplankton each. At that time, *E. monachus* abounded between 450 and 900 m (WEIKERT and KOPPELMANN, 1993). By its abundance, this species seems to be a significant constituent of the Levantine deep-sea copepod assemblage (see also PANCUCCI-PAPADOPOULOU *et al.*, 1988) as compared to the Western Mediterranean (SCOTTO DI CARLO *et al.*, 1984).

The significant differences in the abundance and composition of zooplankton document for the first time the existence of a strong variability in a bathypelagic community at a subtropical latitude. The studied site lies in a region which is affected by a long-living anticyclonic gyre; hence at the present state of investigation, it is not clear, whether or not the observed variability is on a seasonal scale.

Standing crops of zooplankton (Individuals/m^2) at the deep site off Crete. In parentheses: relative abundances

Group/Taxon	January 1987	June 1993
Eucalanus monachus	3722 (20.0)	25706 (30.5)
Calanus helgolandicus	absent	15287 (18.0)
Total copepods	16965 (90.0)	76163 (90.5)
Total zooplankton	18865	84149



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