SPRING EVOLUTION OF WATER COLUMN FEATURES AND PLANKTONIC COMMUNITIES IN THE GULF OF MILAZZO (SICILY)

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Abstract
The present work is based on original data collected during spring 2003 in the frame of a national programme (MIUR Cluster10-SAM) dealing with the development of new technologies and approaches to coastal monitoring. Meteoceanographic forcings are crucial factors in driving dynamics and physical features of coastal waters which in turn strongly influence planktonic communities. High-frequency automatic data improve the detail of the oceanographic context, framing on a longer time-scale the snapshots caught during field campaigns. Joint interpretation helps in discriminating which process (stratification, mixing) mostly influenced planktonic compartment in early May.

Key-words: Meteoceanographic forcings, phytoplankton, microzooplankton, Tyrrhenian Sea

Introduction

Scope of this short note is to describe the relations between the physical features of the water column and the planktonic communities in the Gulf of Milazzo (Sicily), open to the southern Tyrrhenian sea. A synthetic characterization of the study area is presented in (1).

A system approach has been adopted by combining data coming from an automatic platform with quasi-fortnightly field data which included vertical profiling by CTDOF/Rosette and watersamplings above-, within- and below-DCM in a selected 120m-deep station. Standard methods were used for chemical and biological analyses (2).

Results and Discussion

The expected increasing trend of air temperature, initially very steep (30 degrees in early May), was abruptly interrupted due to a two-week period of atmospheric instability which forced a decrease below 20 degrees (Fig. 1). Temperatures raised then to unexpectedly high values for late spring.

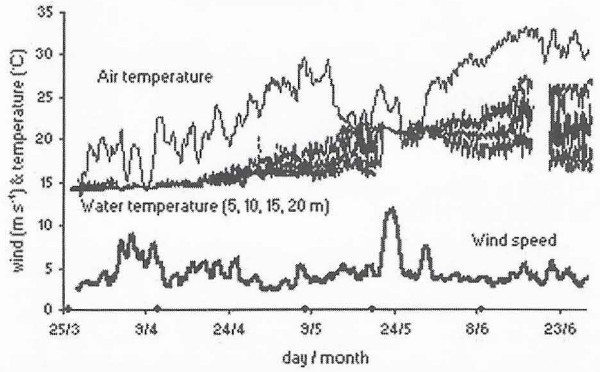

Fig. 1. Platform data: Climatic parameters (24-hours running averages) and hourly watercolumn thermal structure.

Late-winter water column was homogeneous (15 degrees). Differential warming of the uppermost layer began in the second half of April. Seasonal thermocline is already formed in early May (ΔT=5 degrees) when the wind forcing induces a strong mixing which makes homogeneous the uppermost layer (21 degrees). The water column warming continues until the end of spring when the thermocline is about 10 degrees between 5 and 20 m.

Isopycnal trends (Fig. 2) reflect the initial homogeneity of the water column (28.4 σ_t). An evident stratification is then reached, mainly constrained by bottom salinity and uppermost 40m warming. The presence of a pycnocline (50m) is therefore observed in early May. The layer between 28.2 and 28.4 σ_t hosts the DCM which appears in late winter (40m) and reaches 0.5 μg-Chl*a* l^{-1}. In late spring this layer looses buoyancy with the ongoing stratification and carries DCM down to 70m.

Phytoplankton density (Fig. 3) was generally low and uniform (40 to 50 $x10^3$ cells l^{-1}). A slight decrease in early May (30 $x10^3$ cells l^{-1}) is then recovered (max 54 $x10^3$ cells l^{-1}). Flagellates (<20 μm) dominate (80-90%) in the whole period at every depth; the remaining percentage is equally shared by dinoflagellates and diatoms. Only in late winter these latter are relatively more abundant in the intermediate layer and dominate in the lowermost one.

Microzooplankton abundance was generally low with minimum in early April (10 cells l^{-1}) and increased till late spring (40 cells l^{-1}).

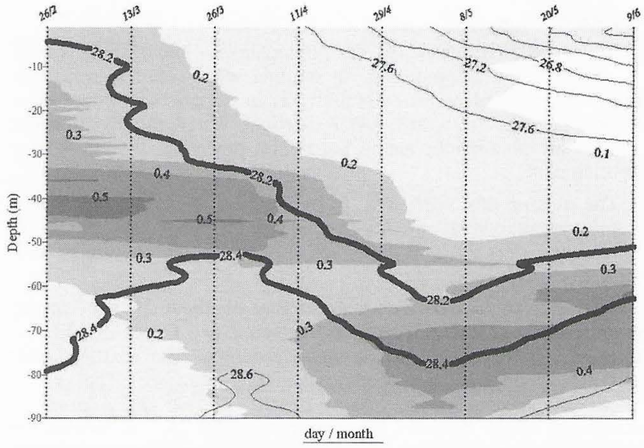

Fig. 2. Field data: Isopleths of density (st) and phytoplankton biomass (mg-Chla l-1) distribution.

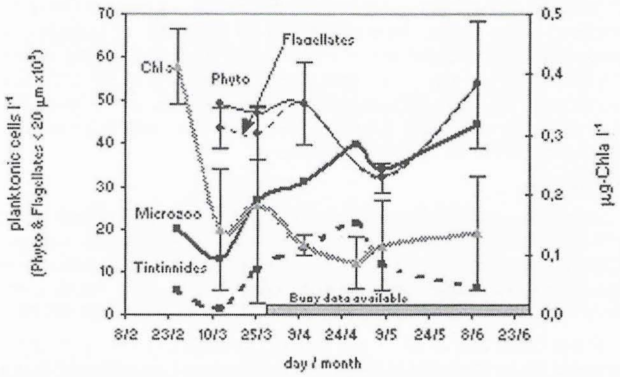

Fig. 3. Planktonic field data: Column-averaged phyto- and microzoo-planktonic densities.

Each of tintinnids and metazoan represented about 40%, non-ciliates protozoan were 10% of the total. Though vertical distribution of these groups exhibited no significant differences, tintinnids were little more abundant in the uppermost layer.

The post spring-bloom outcoming scenario shows phytoflagellates in a stationary phase, controlled by microzooplankton which exhibits an increasing trend characterized by a typical delay with respect to the autotrophic component.

The downlift of the pycnocline in early May induced by water warming determined the sinking of planktonic communities and the generalized decrease of their densities. The subsequent recovery of this biotic component is not influenced by wind-induced mixing in upper layers.

References

1 - Decembrini, F., Azzaro, F., Raffa, F., Galletta, M.G., submitted. Short-term changes of hydrobiological features in the Gulf of Milazzo (Tyrrhenian Sicily), *Rapp. Comm. Int. Mer Médit. (this volume).*
2 - Standard methods for the Examination of Water and Wastewater, APHA, 1976, ISBN 0-87553-078-8.