

# SPATIO-TEMPORAL CHANGES IN STRUCTURE AND FUNCTION OF THE COASTAL ECOSYSTEM IN THE NE BLACK SEA

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## Abstract

We present hydrophysical, chemical and biological data obtained in the different seasons in the coastal zone of the NE Black Sea in 2007-2009. Spatial changes in chemical parameters (nutrients, DO, H<sub>2</sub>S) as well as in primary production, Chl a, POC, phyto- and zooplankton distributions are discussed in relation to hydrophysical conditions and the influence of coastal run-off. Seasonal peculiarities of ecosystem structure and function are described.

*Keywords: Black Sea, Coastal Systems*

## Introduction

The pelagic ecosystem of the coastal area is characterized by a high spatio-temporal variability caused by the complicated physical, chemical, and biological processes running in this region [1]. To a great extent, this variability is related to the presence of fronts, eddies, filaments, etc, which control the intensity and directions of the along- and cross-shelf transport [2], [3]. Meanwhile, the hydrophysical processes occurring near the shore and over the continental slope cause a great diversity of scenarios, which switch depending on wind forcing and the regional climatic changes on both temporal and spatial scales [4], [5]. This study was performed in frame of EU project SESAME and aimed to investigate the coastal ecosystem function and cross-shelf exchange in the NE Black Sea.

## Material and methods

In 2007-2009, monitoring of seasonal variations in physical, chemical, and biological parameters was performed in the coastal region off Caucasian coast. Data were collected along a transect from the shore to deep basin in three seasons, spring, summer, and autumn. CTD-profiling (by SBE 19plus probe) along with chemical (nutrients, DO, H<sub>2</sub>S) and biological (primary production, Chl a, POC, phyto- and zooplankton) sampling were done at three key stations located over the inner-shelf (25 m isobaths), middle-shelf (55 m isobaths) and continental slope (1000 m isobaths). Horizons for hydrochemical and biological sampling were chosen according to *in situ* CTD-profiles.

## Results and discussion

The high amplitude of seasonal variations in the surface temperature (up to 19°C) caused the drastic changes in the structure of pelagic ecosystem. In winter/spring, the seasonal maximum of nutrients as well as Chl-a and primary production (PP) was observed in the upper 10-m layer. After the thermocline formation, the depletion of nutrients in the upper layer led to decrease in Chl-a concentration and PP. Species composition of phytoplankton showed significant seasonal changes with predominance of dinoflagellates in spring, coccolitophorids in summer, and diatoms in autumn but this pattern could vary from year to year. There was a slight tendency to the decrease of nutrients and phytoplankton concentration in the inshore-offshore direction, however the difference was insignificant. This finding suggests an intensive cross-shelf exchange in the study area. PP varied from 210±60 mg C/m<sup>2</sup> day in spring to 175±30 mg C/m<sup>2</sup> day in autumn. Two peaks of zooplankton abundance were observed in spring and autumn at all locations but their intensity differed in the different years. No obvious relationship between phytoplankton concentration and zooplankton biomass were found. The effect of gelatinous top-predators (medusas and ctenophores) on the total zooplankton biomass was insignificant at short-time, monthly, and interannual scales (ANOVA, F=2.34, p=0.1). The surface-dwelling zooplankton populations showed more prominent response to both hydrophysical changes and biological (food and predations) factors.

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