

COUNTRY: TURKEY

Project:

Black Sea GLOBEC

Source of Information:

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System Types Studied:

Semi enclosed, marginal sea with buoyancy and wind driven circulation dominated by mesoscale dynamics and intense meandering boundary current structure

Projects:

1. Regulation of the Black Sea ecosystem by decadal-scale climatic variations and anthropogenic forcing

Project Description:

This research aimed to study the prominent role of climate-induced decadal-scale variability in different trophic levels of the Black Sea ecosystem, and interprets the ecosystem changes as an integrated response of the climatic variability and various anthropogenic and human-induced perturbations. First, all available long-term biogeochemical data are analyzed to determine the robust anthropogenic signal during the 1970s and 1980s. Second, climatic fluctuations and their linkages to major hemispherical climatic oscillations (such as the NAO) are identified both in the biogeochemical and hydro-meteorological data.

Website:

http://www.ims.metu.edu.tr/cv/oguz/bs_res.html

System Types Studied:

Black Sea

Target Organisms:

Plankton, pelagic fish

Physical Processes Examined:

Climatic decadal scale oscillations and accompanying local processes in the physical structure of the surface layer

Key Questions, Hypotheses and Issues:

It is hypothesized that the North Atlantic Oscillation (NAO) play a prevailing role on the Black Sea hydro-meteorological structure and controls decadal structure of biogeochemical processes, plankton biomass, pelagic fish stocks.

Number of scientists : 2

Participating Institutions:

Institute of Marine Sciences, Middle East Technical University.

Duration: 2 years

Funding Agency:

Turkish Scientific and Technical Research Council (TUBITAK)

2. Effects of physical and biogeochemical variabilities on the spatial heterogeneity of the zooplankton distribution in the Black Sea

Project Description:

This research aimed to study the physical and biogeochemical processes determining the hydrodynamic impact on the distribution of zooplankton. The study contains both observational and modelling components.

The large scale upper layer circulation over the deep portion of the basin is generally cyclonic with a system of anticyclonic eddies evolving in its periphery. The edge of the cyclonic circulation is dominated by an internal anticyclonic jet: the Rim Current. The Rim Current carries nutrient rich river waters originated from the northwestern region and the biological production is high on this waters. Zooplankton were mainly advected to the region with the Rim Current. The presence of the anticyclonic eddies between the Rim current and the coast were entrapping the zooplankton as well as the other biogeochemical variables.

System Types Studied:

Black Sea coastal and open waters ecosystem dynamics

Target Organisms:

Zooplankton

Physical Processes Examined:

Shelf and open sea processes

Key Questions, Hypotheses and Issues:

The main goal of this study is to understand how physical and biogeochemical processes influence zooplankton abundance and distribution in order to predict the response of the ecosystem.

Number of scientists and fte: 2+3

Participating Institutions:

Institute of Marine Sciences, Middle East Technical University

Duration: 2 years

Budget: 40,000 USD

Funding Agency:

Turkish Scientific and Technical Research Council (TUBITAK), NATO

3. Egg production and growth of copepods in NE Mediterranean Sea

Project Description:

This study considers the nutritional environment and its relationship to egg production by copepods in NE Mediterranean Sea. Virtually no information exists about the nutritional quality (protein and lipid concentrations, and carbon: nitrogen ratio) of the seston in NE Mediterranean Sea. Seasonal variations in copepod abundance, egg production and growth rates were determined and they were correlated with food quality and quantity.

System Types Studied:

Coastal and open ocean ecosystems in the Mediterranean Sea

Target Organisms:

Temora stylifera

Acartia clausi

Key Questions, Hypotheses and Issues:

In this study, we intended to enhance our understanding of numerical response of copepods in food availability and quality in an oligotrophic environment.

Number of scientists and fte: 2+1

Participating Institutions:

Institute of Marine Sciences, Middle East Technical University

Duration: 1 year

Budget: 10,000 USD

Funding Agency:

Turkish Scientific and Technical Research Council (TUBITAK)

Middle East Technical University

4. Spatio-temporal dynamics of two zooplankton species as acoustically inferred in the Black Sea.

Project Description:

Monthly acoustical data collected within the past decade were examined to discriminate and identify the layers of densely populated *Calanus euxinus* and *Sagitta setosa* in the Black Sea. Acoustical data were collected with the echosounder BioSonics Model 120 at 120kHz and 200kHz and an acoustic Doppler current profiler (ADCP, RD broadband) at 150kHz. This method allows in situ monitoring of the species; estimation of biomass and spatio-temporal distributional patterns.

System Types Studied:

Offshore pelagic, the Black Sea

Target Organisms:

Calanus euxinus

Sagitta setosa

Physical Processes Examined:

Volume backscattering strength

Dissolved oxygen

Basic physical parameters (temperature, salinity, density, current)

Key Questions, Hypotheses and Issues:

Calanus euxinus have distinct patterns of vertical migration and time spent swimming, depending on the DO concentration of the water column, Time spent swimming (T , %) does not depend on water temperature. Under normoxic conditions, T varied widely from 15–20% to 90–95%. When oxygen concentration declines to the values characterizing *C. euxinus*' daytime habitat at depth (0.8–1.15mg O₂ l⁻¹), T of all investigated animals increases to 80–100%. The concentration layer of *Sagitta setosa* can acoustically be identified by observing their diel migrational pattern during different months in the Black Sea. *Sagitta setosa* shows different temporal patterns depending on their generation time and stage composition. During the cold-water season when their population consists mainly of adult individuals, their daytime concentration layer coexists with that of *C. euxinus* in the OMZ whereas in warm-water season when the immature individuals (juveniles) comprises more 60% of the population, the concentration layer stays in the oxycline. In July and September, individuals of new generation do not migrate during the day and stays in subsurface water. *Calanus euxinus* starts accelerating upon entering the oxycline while *setosa* accelerates after entering well-oxygenated subsurface water. *Sagitta setosa* completes its migration within 4 hrs at an average swimming speed. In contrast to the pattern observed during downward migration, *C. euxinus* laggings behind *S. setosa* during upward vertical migration.

This ability would allow in situ monitoring of the species; estimation of biomass and spatio-temporal distributional patterns during the day could then be considered in past and future works.

Number of scientists and fte: 1

Participating Institutions:

Institute of Marine Sciences, Turkey

Duration: 2002-2005

Funding Agency:

The Scientific and Technical Research Council of Turkey (TUBITAK)

5. Mnemiopsis predatory impact on the pelagic community of the Black Sea.**Project Description:**

The objective of the proposed research is to assess the food supply and predatory effect of the ctenophore *Mnemiopsis* population on mesozooplankton and fish larvae stocks and to quantify its role in energy transformation within the pelagic community.

The proposed study will promote the identification of the relative contribution of *M. leidyi* predation to the observed decrease in the plankton community biomass.

Results obtained may be used to improve the ecological model of the Black Sea pelagic ecosystem functioning and to gain a better understanding of ctenophore population dynamics for future.

Target Organisms:

Zooplankton

Key Questions, Hypotheses and Issues:

- Determination of ingestion, respiration and growth rates of *Mnemiopsis* and the effects of food concentration, body weight and temperature on these parameters.
- Study of annual dynamics of abundance, biomass and population structure of *M. leidyi* in the Black Sea.
- Determination of the chemical composition (protein, lipids, carbohydrates, glycogen, mono- and polysaccharides) and evaluation of the ctenophore's condition in the Black Sea.

Number of scientists and fte: 10

Participating Institutions:

Mayis University, Faculty of Aquatic Products, Sinop, Turkey,
Institute of Marine Sciences, Middle East Technical University,
Institute of Biology of the Southern Seas, Nat. Academy of Sciences of Ukraine.

Duration: 2 years

Budget: 25,000 USD

Funding Agency: NATO