

## Some Physical and Chemical Specifications of Sea Water in the Offshores of Trabzon

**Ali ALKAN, Serkan SERDAR, Bayram ZENGİN**

### PURPOSE

The Black Sea has different characteristics amongst the world seas. When examined ecosystematically, it is noticed that there are many unanswered scientific problems with current importance. Despite the fact the oceanographic researches conducted for many years in the Black Sea play a very important role in the identification of general physical and biochemical characteristics of the system, these researches cannot be deemed to be sufficient.

Currently, the countries in this periphery benefit from the characteristics of the Black Sea especially in the fisheries, tourism, and sea transport sectors and semi-treated household and industrial wastes are discharged in the coastal waters. The Black Sea, being a closed basin with high level of fresh water input, is losing the ecological balance which necessitates the rational use of resources.

In last thirty years, ecologists have been expressing the striking changes in the ecosystem of the Black Sea. Terrestrial nutrients (phosphorus and nitrogen) in big quantities are transported especially into the broad continental shelf by huge rivers, which is in the northeast part of the region. These food elements caused different changes such as over-production of plankton on the surface waters of the region; and over-accumulation of organic substances on the seabed gives rise to the formation of oxygen-free conditions in the shallow waters leading to the end of the life here. Generally, the fish species with commercial value and their catchability amounts have decreased. Some new species are becoming predominant in the ecosystem while some other species with commercial value are being endangered. During this changing process in the ecosystem, the types of changes on the hydrochemical characteristics of the system are not adequately known yet.

The success of the future management programs for the protection of the Black Sea is possible by differentiating the long term hydrochemical changes in the ecosystem from the short-term changes based on the

hydrographical features of the system. Views based on solid scientific data which help in identifying the difference, have not been raised sufficiently until now.

In order to understand the chemical, biochemical and physical events which are generally influencing the sea water composition the vertical and horizontal distribution parameters (e.g. temperature, salinity, density, pH, alkalinity, electrical conductivity, dissolved gasses, nutrients and inorganic elements) and their changes should be determined over time.

Within this framework, the purpose of the project is to investigate monthly and seasonal changes of some physical and chemical parameters (temperature, salinity, sigma-t, electrical conductivity, dissolved oxygen, chlorophyll-a, transparency, sechii disc) on the water column for the objective of establishing a database of long-term data to be used for different goals.

### FINDINGS

The project was conducted at 2 separate stations of 50m and 200m depths between 40°58.385' N-39°50.982' E and 40°58.662' N-39°51.275' E in offshores of Trabzon, Yomra in the Black Sea, by making measurements for 33, 24 and 19 times in 2001, 2002 and 2003, respectively.

Within the framework of this project, the changes of certain physical and chemical parameters (temperature, salinity, density, electrical conductivity, pH, dissolved oxygen, transparency and chlorophyll-a) on the water column have been investigated over a year. The measurement of these parameters was done with SBE-25 model CTD system.

The profiles of measurements done on the water column at different time periods based on depths were examined, and the changes on the parameters based on time periods and depths were identified.

Values of sea surface temperature peaked at 28.06±0.90°C in August in parallel with air temperature and decreased to the minimum level of 8.80±1.15°C in February and March. The difference in the sea surface temperature remained as around 19-20°C and

became 6-7°C; 2-2.5°C, and 0.5°C at 50m, 100m and 200m depths, respectively.

During the study period, the average salinity of sea surface was determined as ‰17.69±0.16. Salinity values have reached to an average of ‰18.11±0.12; ‰19.20±0.50, and ‰21.22±0.14 at 50m, 100m and 200m depths, respectively.

The lowest average surface density (sigma-t) was measured as 9.42±0.17 kg/m<sup>3</sup> in August. The highest average density was attained at the level of 13.77±0.12 kg/m<sup>3</sup> in February. Depending on the depth variation, the average values were 13.86±0.26 kg/m<sup>3</sup>; 14.89±0.39 kg/m<sup>3</sup>; and 16.40±0.10 kg/m<sup>3</sup> at 50m, 100m and 200m depths, respectively.

Electrical conductivity of surface was a minimum of 2.01±0.06 S/m in February and a maximum of 3.06±0.08 S/m in August. Average electrical conductivity values were measured as 2.074±0.084 S/m; 2.108±0.046 S/m and 2.345±0.014 S/m at 50m, 100m and 200m depths, respectively.

pH changes of surface were between 7.8 to 8.4 and started to decrease especially under photosynthesis zone and stabilized at 7.6-7.7.

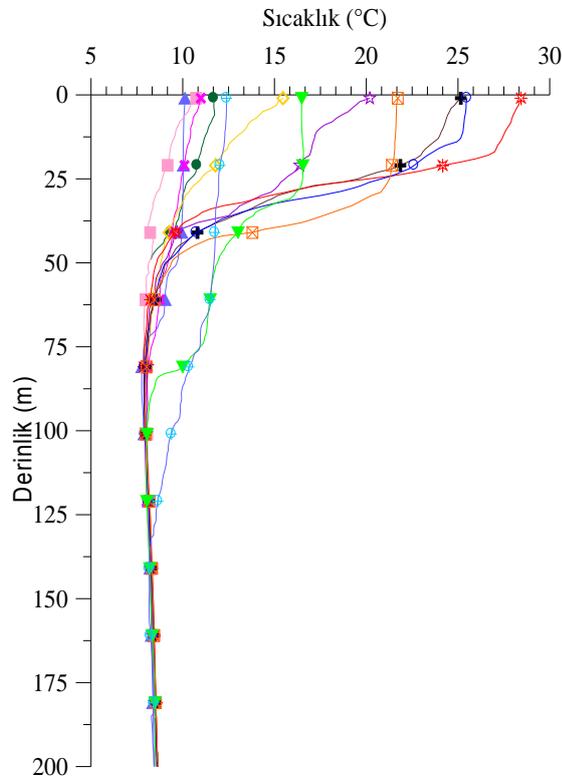


Figure 1. Monthly average temperature changes on water column up to 200m

Dissolved oxygen changed depending on the surface temperature and decreased to zero at 200 as depth increased.

Chlorophyll-a on the surface varied between 0.2-6 µg/L and the change was important at the first 50m depending on depth.

## RECOMMENDATIONS

This study covers physical and chemical parameters measured on the water column of 200m. Undoubtedly, time-based observation of changes on the characteristics of seawater bears huge importance for the determination of causes and the dimensions of these changes, which directly influence the lives of the aquatic creatures due to the phenomena of reproduction, feeding and migration. Therefore, there is a need to know these parameters for aquacultural activities, for the studies to be conducted on the biological and chemical changes, and for marine fish culture.

It shall definitely be useful to develop further studies on the above-mentioned topics based on the data gained in this present study, by making all these efforts multidisciplinary by means of adding certain chemical and biological parameters. However, as the marine researches are costly, collaboration of as many people, institutes and organizations possible shall save time, labor and money for the parallel studies to be simultaneously conducted in the future.

Especially, the data in this study must be taken as a basis by the marine fish culturists to plan the period and timeframe of marine aquaculture by taking the natural requirements of these fish.

In addition to the benefits for the offshore fish culture, this data shall also be useful in order to determine the time period and the depths of water body to meet the optimum needs of the species cultured in the inshore fisheries facilities. These parameters are necessary for the transport of cold water during the hot weather and this study shall meet the gap in this sense.

Due to the stratification and anoxic conditions in the structure of the Black Sea, the environment is considered to be appropriate for coastal and deep discharge. And the practice of this kind of work is being realized in our region. It shall be possible to measure, before and after this type of practices, the types of changes occurring on the physical and chemical characteristics of the environment by means of measuring the basic parameters. Therefore, the data obtained should be benefited to make comparison in the further practices.