Hydrochemical Properties of the Turkish Seas and their Relation with Circulation Dynamics as Inferred from Thermal and Colour Satellite Data

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The Institute of Marine Science of the Middle East Technical University was involved in seasonal surveys of the seas surrounding Turkey. During these cruises physical and chemical oceanographic parameters have been collected extensively. The analysis of these data has led to improve the knowledge about the time and space distribution of hydrochemical parameters. The utilization of remote sensing data collected by satellites has further improved our interpretation of the data.

Mediterranean Sea

The Eastern Mediterranean is an oligothrophic sea. Due to convective mixing it has very uniform characteristics. The general circulation dynamics of the system is very well defined and it was found that the distribution of the chemical parameters is governed by the same phenomena. The only major upwelling area is detected around the Rhodes Gyre which pumps the nutrients from the bottom layer into the euphotic zone. The light penetration is as deep as 100 meters and thus the observation of the increase in the abundance of pigments can not be detected by color scanners; this upwelling can however be sensed very accurately due to its thermal properties. The observation of the Asia Minor Current which meanders along the Anatolian coastline is another important feature since it sustains a steady westerly transport along the coastline. This current is fed by the flow of the mid Mediterranean jet. Therefore the coastline of the North Eastern Mediterranean Sea is poor in fisheries except at a few places where rivers enter the sea. The extent of their fresh water input and the associated pigment can be traced by color scanners around major rivers such as the Goksu Ceyhan and Seyhan.

Sea of Marmara

The Marmara Sea has a very recent history of about 12,000 years as a passage between the Mediterranean and the Black Sea. The major feature of this semi-enclosed sea is the presence of a two-layer system. The upper layer which is only 25 meters deep is brackish Black Sea water and the bottom layer is saline Mediterranean water. The very high nutrient concentration observed in the bottom layer under normal conditions can not penetrate the salinity barrier and vice-versa the solar light can not penetrate this barrier as well. Thus either wind-induced mixing or the entrapment of bottom layer by the jet flow entering the Marmara Sea can induce the mixing of these two water bodies. Wind-induced mixing is effective during the winter period but the jet flow exists throughout the year. This mechanism sustains the formation of primary production all year round with some seasonal inputs coming from the Black Sea. Thus the northern entrance of the Marmara Sea is very productive and this results in the formation of large concentrations of organic matter which eventually sink to the bottom layer demineralizing while consuming oxygen. This process decreases the oxygen level of the bottom layer. Since the only supply of oxygen is through the Dardanelles underflow the deep layer oxygen content increases towards the Dardanelles.

The use of satellite data, both IR and archived color is very useful in defining the distribution of hydrochemical parameters in the Sea of Marmara.

GRUPO DE OCEANOGRAFIA
Departamento de Física
Faculdade de Ciências - Universidade de Lisboa

Satellite Oceanography and its Applications

Proceedings of a Workshop held at the University of Lisbon, Portugal,

in November 25-27, 1991, under the sponsorship of the

NATO Science for Stability Programme

Edited by

Armando F. G. Fiúza

Rua da Escola Politécnica, 58
1200 Lisboa - PORTUGAL

1994