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DISTRIBUTION OF NUTRIENTS AND CHLOROPHYLL-A IN SAROS BAY

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Abstract

The distribution of inorganic nutrients and chlorophyll-a were investigated in relation to the hydrography of the Saros bay in the Northern Aegean Sea. The data were collected during cruises in the period of March 2002 and December 2003, in the framework of a National project of TUBITAK. Levels of nutrients were generally lowest in the surface waters, they increased with depth. Elemental ratios of N:P and S:P were calculated to be 0.39-81.5 and 4.18-107.0, respectively. Besides high chlorophyll-a levels in surface waters, there were other maximum chlorophyll-a depths varied at 25-100 m interval in some periods.

Keywords : Aegean Sea, Coastal Systems, Eutrophication, Primary Production.

The Aegean Sea is one of the Eastern Mediterranean sub-basins located between the Greek and Turkish coasts and the islands of Crete and Rhodes. North Aegean Sea takes the mass inputs of Black Sea surface waters through the Bosphorus and the Dardanelles. The Saros bay is a part of the Northern Agean Sea and has maximum 650 m mean depth (Fig. 1). This study was carried out to determine the seasonal variations of nutrient and chlorophyll-a in relation to some CTD in the Saros Bay in period of 15 March 2002 and 30 December 2003. In this study, depths of 0.5, 10, 25, 50, 75, 100, 150, 200, 300, 400 and 500 m were accepted for standard sample depths. It was collected 54 samples for chlorophyll-a and 84 samples for nutrient in seasonal and vertical profile. CTD parameters such as temperature and salinity, nutrient and chlorophyll-a were measured by using YSI 556 MPS, Technicon Model Two Channel Autoanalizor and Jasco V-530 UV/VIS spectrophotometer, respectively [1].

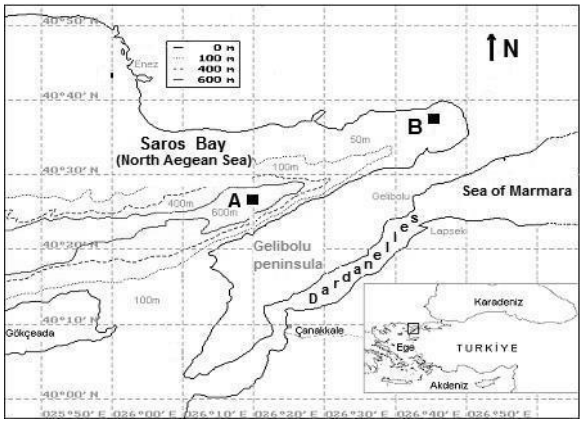


Fig. 1. Fig. 1. Saros Bay (North Aegean Sea) and sampling stations

Temperature and salinity were ranged between 11.26-24.82 °C and 30.35-38.99 ppt, respectively. Dissolved oxygen concentrations changed from 5.09 to 12.69 mg L^{-1} in the Saros Bay. Vertical temperature stratification was clear in spring and summer period in Saros Bay. There was also vertical stratification in salinity profile due to the Black Sea originated low salinity surface waters. Concentrations of NO^-_2+NO^-_3, PO^{-3}_4 and SiO_4were between 0.07-4.21, 0.02-0.19 and0.75-6.32 μM, respectively. Concentration of NO^-_2+ NO^-_3(0.06-1.38 mM) in surface waters were lower than deep water values (0.05-1.60 mM) between March 2002 and December 2003 (Fig. 2). On the other hand, PO^{-3}_4 concentrations were also higher in the surface waters (0.02-1.53 mM) when compared to deep waters (0.02-1.36 mM) in the same period. Similar to NO^-_2+ NO^-_3, SiO_4 values were lower in the surface waters (0.53-3.77 mM) than deep waters (0.67-4.48 mM) (Fig. 2). N:P and S:P ratios ranged between 0.09-81.5 and 0.76-107, respectively in the Saros bay. The lowest N:P values were observed in the surface waters in March and May 2002. Generally, there was a regular increase with depth in N:P and S:P ratios. These ratios in this study were much higher than both the Redfield ratios (N:P=16:1; S:P=15:1) and a previous study [2]. Similar to the Dardanelles nitrate was more limiting nutrient than phosphate in Saros Bay.

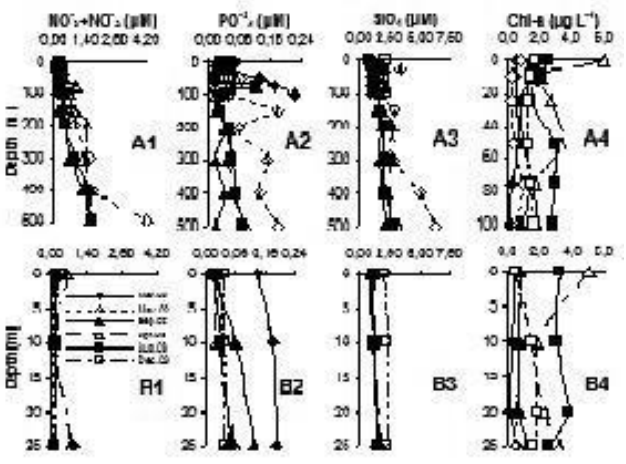


Fig. 2. Fig. 2. Vertical distribution of nutrient and chlorophyll-a in different season in the Saros bay (North Aegean Sea, Turkey) (A1-A4: Offshore station; B1-B4: Inshore Station)

The vertical distribution of chlorophyll-a showed that it ranged between 0,2029 mg L^{-1} (in May 2002) and 6,0424 mg L^{-1} (in April 2003) for the surface waters (0-10m) in Saros Bay. Surface chlorophyll-a level of both inshore and offshore station were higher (1.2145-6.0424 μg L^{-1}) in April 2003 and August 2003 than the other seasons 0.0845-1.8932 μg L^{-1}) (Fig. 2-A4, B4). Particularly, maximum chlorophyll-a depths were between 25-100 m in offshore station in surface chlorophyll-a lower periods. Chlorophyll-a levels were generally lowest ($\leq$1.0 μg L^{-1}) in March and May 2002. Chlorophyll-a levels in December 2003 were already much higher than March and May 2002 (Fig. 2). High chlorophyll-a levels in the Saros bay were related to phytoplankton blooms in same period. On the other hand, there was decrease with depth according to vertical profiles of both inshore and offshore stations due to high chlorophyll-a levels in surface waters. Besides high chlorophyll-a concentrations in surface waters, there were other maximum chlorophyll-a depths (50 m) out off surface (0-10 m) in some periods (especially in April and August 2003) (Fig. 2). It is known that maximum chlorophyll-a depths are found at 50-100 interval in the Mediterranean due to very lowest the concentrations in surface waters [2]. However, chlorophyll-a levels were high in surface (0.5 m) and sub-surface (10 m) waters of the Saros bay due to Black Sea originated surface waters and vertical mixing in the area.

Acknowledgments

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