

Phytoplankton composition of south east Black Sea coast

Güney doğu Karadeniz sahillerinin fitoplankton kompozisyonu

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Abstract

The aim of the present paper is to compare the phytoplankton composition during the two sampling periods: 1993-1994 and 2001-2002 in the SE Black Sea coast. A total of 115 species belonging 5 classes were found in the sampling area.

Diatoms and Dinoflagellat were the main dominant phytoplankton in the samples for the periods considered, but dinoflagellat ratio was observed to have increased from about 35 % to 41 % in the year 2001-2002.

Key words: Phytoplankton, species list, Black Sea,

Introduction

The Black Sea is semi-enclosed sea and virtually isolated, connected with the Mediterranean by small and narrow channel, Bosphorus and characterized by two large cyclonic gyres in eastern and western parts (Oguz *et al.*, 1993). This two cyclonic cyres system separates the Black Sea as east and west Black Sea Region on Anatolian coast. Because of the enclosed basin characteristics, the pelagic ecosystem of the Black Sea is continuously changing at surprising rates (Soydemir *et al.*, 2002). Existing environmental changes and their impact on phytoplankton composition is of great important

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(Uysal, 1996). There is enough background data on phytoplankton composition and unique species distribution for South Eastern Black sea coast. A few studies have been reported by limited researchers (Feyzioğlu and Tunçer, 1989; Karaçam and Düzgüneş, 1990; Feyzioğlu and Tunçer, 1994; Uysal and Sur, 1995; Feyzioğlu and Düzgüneş, 1996; Uysal *et al.*, 1998; Ekere *et al.*, 1999, Feyzioğlu and Sivri, 2003). This report does not include the changes of species composition for a long period. But, shows the composition of net phytoplankton species between 1993-1994 and 2001-2002 sampling season intervals in the South Eastern Black Sea coast.

Material and Methods

Phytoplankton samples were taken on board R/V KTU DENAR and R/V YAKAMOZ during the period of April 1993- March 1994 and April 2001- March 2002 respectively off Trabzon on the Eastern Black sea coast of Turkey near Georgian border.

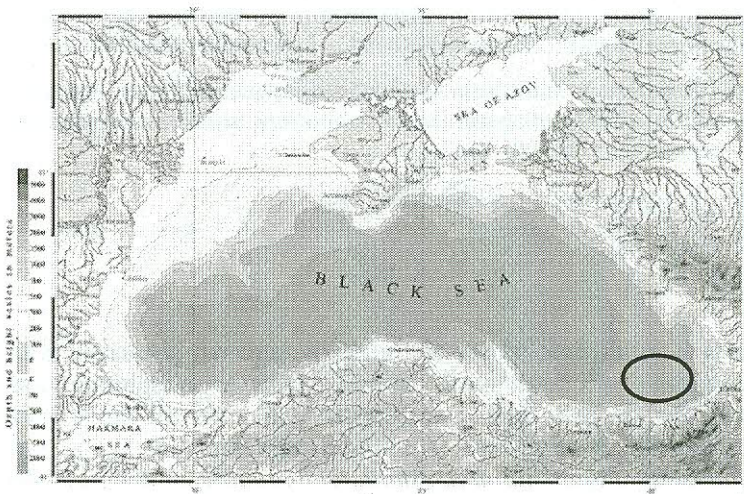


Figure1. Sampling location of Trabzon

Phytoplankton material was collected with 20 μm plankton and 9 L Kahlsico water sampler bottle for qualitative and quantitative analysis, respectively. The samples collected by plankton net were kept for live observation and the samples collected with the bottle were fixed with borax buffered neutral

formaldehyde *in situ* for quantitative analysis (Thronsdén, 1978). Soon after all were brought to lab, wet mounts were examined under Nikon E600 Fluorescence microscopy and Olympus BH-2 light microscopy with 10x, 100x, and 400x magnifications for identification. For dinoflagelates, the samples were stain with Calcofluor White M2R and observed under Nikon E 600 Epifluorescent microscope at 400x and 1000 x with a filter combination of B-2A (EX 330-380, DM 400 and BA 420) (Laurenve and Triemer, 1985). Identification of the existing species were based on the study of Tomas (1996), Tomas (1993), Fukuyo *et al.*, (1990), Balech (1988), Spector (1984), Ramphi and Bernhard (1978), Drebes (1974)

Results

A total of 115 species of Bacillariophyceae (62), Bacillariophyceae (62), Dinophyceae (39), Euglenophyceae (6), Chloprophyceae (3), Crysoephyceae (4), Primnesiophyceae (1) were identified in the both sampling periods (1993-1994 and 2002-2002). In the area where samplings performed diatom were found to be the dominant group (53,78 %). Second important systematic group was observed to be dinoflagelletes (34, 45 %). Figureures 3 and 4 show species distribution of 1993-1994 and 2001-2002 sampling periods. According to the observations 102 and 68 species were noticed in 1993-1994 and 2001-2002 respectively. Fourteen species belonging to Bacillariophyceae, Dinophyceae and Crysoephyceae were observed only in the sampling season of 2001-2002. Fifty two species of microphytoplanktonic organisms were also identified in both sampling periods; 1993-1994 and 2001-2002. Diatom has however decreased from 53.78 % (in 1993-1994) to 44.12 % (in 2001-2002) while an increase (from 33.65 to 41.18 %) was noticed in dinoflagelletes in the same period.

Discussion

In the present paper a total of 115 species were identified. Feyzioğlu and Tuncer (1994) reported 97 species in the same area for the year of 1988-1989 sampling period. There was no any other information available for South Easter black sea coast regarding phytoplankton comparison. Beside this, several researches were conducted in the South West Black Sea. As well as Benli (1987) who reported 94 species. Türkoglu and Koray (2002) also reported 179 taxa from neitic water of Sinop peninsula. In their studies they stated a total of 24 species of Ceratium, 20 species of Chaetoceros and 12 species of Prorocentrum. It can be concluded that western part of Turkey is more likely to be more divers than that of the Eastern since we found 3

species of *Ceratium*, 9 species of *Chaetoceros* and 5 species of *Prorocentrum* in the Eastern Black Sea. This, of course, reflects the only, check list of phytoplankton species, and of course subject to more detail study.

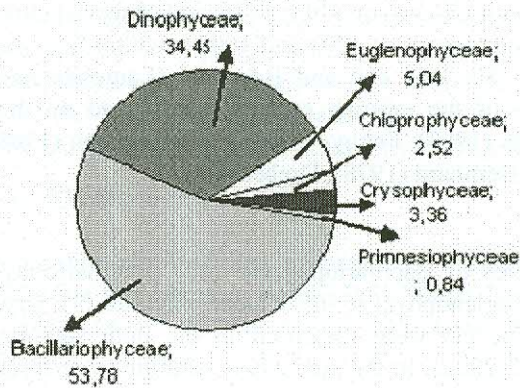


Figure 2. % of main phytoplankton groups observed

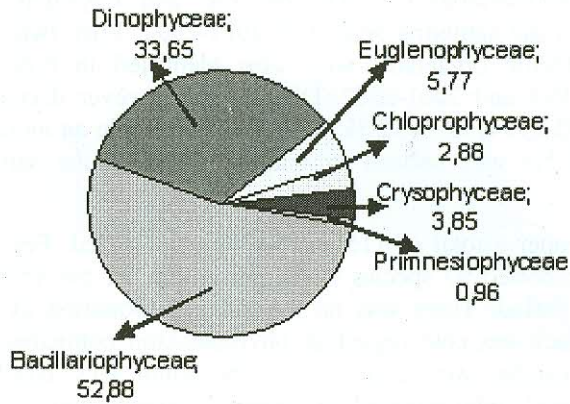


Figure 3. % of main phytoplankton groups in 1993-1994 sampling period

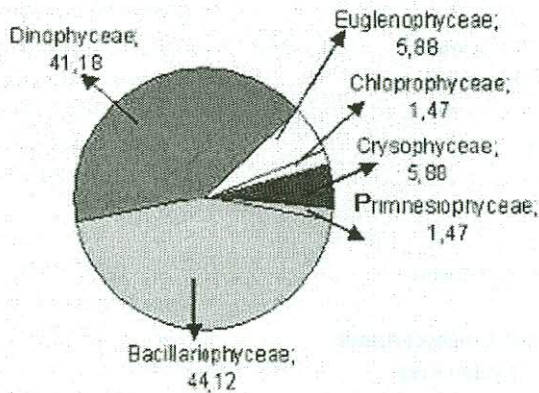


Figure 4. % of main phytoplankton groups in 2001-2002 sampling period

Table 1. Species list of sampling area during 1993-1994 and 2001-2002

Bacillariophyceae	1993- 1994	2001- 2002
<i>Achnanthes longipes</i> J. Agardh	+	
<i>Amphora arenicola</i> (Grunow) Cleve	+	
<i>Amphora ovalis</i> Kütz	+	
<i>Amphora</i> sp.	+	
<i>Asterionella japonica</i> Cleve & O.F. Müll.		+
<i>Ceratoneis arcus</i> (Ehr.) Kütz	+	+
<i>Ceratulina bergonii</i> Schütt	+	+
<i>Chaetoceros affinis</i> Lauder	+	+
<i>Chaetoceros brevis</i> (Schütt)	+	+
<i>Chaetoceros compressus</i> Lauder	+	
<i>Chaetoceros crinitus</i> Schütt	+	
<i>Chaetoceros curvisetus</i> Cleve	+	
<i>Chaetoceros danicus</i> Cleve	+	
<i>Chaetoceros decipiens</i> Cleve	+	+
<i>Chaetoceros lauderi</i> Lauder	+	

Table 1. Continued

<i>Chaetoceros vixvisibilis</i> Schill	+	
<i>Chaetoceros wighamii</i> Brightwell	+	
<i>Chaetoceros</i> sp.		+
<i>Coscinodiscus granii</i> Gough	+	+
<i>Coscinodiscus nodulifer</i> A.Schmidt	+	+
<i>Coscinodiscus radiatus</i> Ehrenberg	+	+
<i>Coscinodiscus</i> sp.	+	+
<i>Cyclotella caspia</i> Grun	+	
<i>Cymatopleura</i> sp.	+	
<i>Cymbella</i> sp.	+	
<i>Diatoma hiemale</i> Heibe	+	
<i>Ditylum brightwellii</i> (west) Grunow	+	+
<i>Epithemia</i> sp.	+	
<i>Gomphonema geminatum</i> (Lyngbye) Agardh	+	
<i>Gramatophora marina</i> (Lyngb) Kütz	+	
<i>Hemiaulus hauckii</i> Grunow		+
<i>Hemiaulus sinensis</i> Greville		+
<i>Leptocylindrus danicus</i> Cleve	+	+
<i>Licmophora ehrenbergi</i> (Ktz) Grun	+	
<i>Licmophora</i> sp.	+	+
<i>Melosira nummuloide</i> C.A. Agardh	+	+
	1993- 1994	2001- 2002
<i>Melosira varians</i> Agardh	+	
<i>Melosira</i> sp.	+	+
<i>Navicula lyra</i> Ehr	+	
<i>Navicula</i> sp.1		+
<i>Navicula</i> sp.1	+	
<i>Nitzschia angulata</i> Halse	+	
<i>Nitzschia closterium</i> (Ehrenberg) W. Smith.		+
<i>Nitzschia longissima</i> (Breb) Ralfs.	+	+
<i>Pleurosigma normanii</i> Ralfs	+	
<i>Pleurosigma</i> sp.	+	+
<i>Pseudo-nitzschia delicatissima</i> (Cleve) Heiden	+	
<i>Pseudo-nitzschia pungens</i> (Grunov ex Cleve) Hasle	+	
<i>Pseudo-nitzschia</i> sp.	+	+
<i>Rhizosolenia alata</i> Brightwell.	+	+
<i>Rhizosolenia calcar-avis</i> Schultze	+	+
<i>Rhizosolenia fragilissima</i> Bergon	+	

Table 1. Continued

<i>Skeletonema costatum</i> (Grev.) Cleve	+	+
<i>Striatella delicatula</i> (Kütz) Grun	+	
<i>Surirella</i> sp	+	
<i>Synedra ulna</i> (Nitzsch) Ehrenberg.	+	
<i>Thalassionema nitzschioides</i> Grunov ex Cleve	+	+
<i>Thalassiosira decipiens</i> (Grun) C. Jürg	+	
<i>Thalassiosira nordenskiöldii</i> Cleve	+	+
<i>Thalassiosira polycorda</i> Gran	+	
<i>Thalassiosira rotula</i> Meunier		+
<i>Thalassiosira</i> sp.	+	
Dinophyceae		
<i>Ceratium furca</i> (Ehrenberg)	+	+
<i>Ceratium fusus</i> (Ehrnberg) Dujardin	+	+
<i>Ceratium tripos</i> (O.F.Müller) Nitzsch	+	+
<i>Dinophysis acuminata</i> Claparede & J. Lachm.		+
<i>Dinophysis caudata</i> Kent	+	+
<i>Dinophysis fortii</i> Pavillard	+	+
<i>Dinophysis hasdata</i> J.R.Stein		+
<i>Dinophysis rotundata</i> Clap & J. Lachm	+	+
<i>Glenodinium lenticula</i> (Bergh) Schiller	+	+
	1993-1994	2001-2002
<i>Gonyaulax africana</i> Schiller	+	
<i>Gonyaulax digitale</i> (Pouchet) Kofoid	+	
<i>Gonyaulax polyedra</i> F. Stein	+	
<i>Gonyaulax spinifera</i> (Clap & Lachm) Diesing	+	
<i>Gymnodinium sanguineum</i> Hirasaka	+	+
<i>Heterocapsa triquetra</i> (Ehrenberg) Balech	+	+
<i>Noctiluca scintillans</i> (Macartney) Kof. & Swezy	+	+
<i>Oxytoxum</i> sp	+	
<i>Prorocentrum aporum</i> (J. Schiller) T.H. Abé	+	
<i>Prorocentrum balticum</i> (Lohmann) A.R. Loebel	+	
<i>Prorocentrum compressum</i> (Bailey) T.H. Abé	+	+
<i>Prorocentrum micans</i> Ehrenberg	+	+
<i>Prorocentrum minimum</i> J. Schiller		+
<i>Protoceratium reticulatum</i> Bütschli		+
<i>Protoperidinium brevipes</i> (Paulsen) Balech	+	
<i>Protoperidinium claudicans</i> Paulsen	+	+
<i>Protoperidinium conicum</i> (Gran) Balech	+	

Table 1. Continued

<i>Protoperidinium crassipes</i> Kofoid	+	+
<i>Protoperidinium curtipes</i> Jurgensen	+	
<i>Protoperidinium depressum</i> (Bailey) Balech	+	+
<i>Protoperidinium divergens</i> (Ehrenberg) Balech	+	+
<i>Protoperidinium excentricum</i> (Paulsen) Balech	+	
<i>Protoperidinium granii</i> (Ostenf) Balech	+	+
<i>Protoperidinium leonis</i> (Pavillard) Balech	+	
<i>Protoperidinium pallidum</i> (Ostenfeld) Balech	+	+
<i>Protoperidinium paulseni</i> Paul	+	
<i>Protoperidinium pellucidum</i> (Berg) Balech	+	+
<i>Protoperidinium steinii</i> (C.Jorg) Balech	+	+
<i>Protoperidinium sp.</i>	+	+
<i>Scripsiella trochoidea</i> (Stein)	+	+
Euglenophyceae		
<i>Euglena acusformis</i> Schiller	+	+
<i>Eutrophia lanawi</i> Steuer	+	
<i>Euglena viridis</i> Perty	+	
<i>Euglena sp.1</i>	+	+
<i>Euglena sp.2</i>	+	+
<i>Eutreptia sp.</i>	+	+
	1993- 1994	2001- 2002
Clorophyceae		
<i>Clorella sp.</i>	+	+
<i>Merimopedia elegans</i> A.Braun	+	
<i>Trochodesmium sp.</i>	+	
Dictyochophyceae		
<i>Dictyocha fibula</i> Ehrenb.	+	+
<i>Dictyocha octonaria</i> Ehrenb.	+	+
<i>Dictyocha polyactis</i> Ehrenb.		+
<i>Dictyocha speculum</i> Ehrenb.	+	+
Prymnesiophyceae		
<i>Emiliania huxleyi</i> (Lohman) W.W. Hay R Mölder	+	+

Pennat diatom species were more copious in 1993-1994 when compared to 2001-2002 sampling period. Dinoflegellates ratios increased from 33.65 %

in 1993-1994 to 41.18 % in 2001-2002 sampling season. A similar trend was also noticed by Nesterova (1986) for western Black Sea.

In the present paper, Comparison of the two sampling periods in 7 year interval shows that species composition tend to change over the years. It needs further detail investigation through monitoring studies for the determination of the changes in the composition of phytoplanktonic species by area and time.

Acknowledgement

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Özet

Bu çalışmanın amacı Güney Doğu Karadeniz' de 1993-1994 ve 2001-2002 örnekleme dönemlerinde mevcut fitoplanktonun kompozisyonunun karşılaştırılmasıdır. Çalışmalar süresince örnekleme alanında 5 sınıfa ait toplan olarak 115 tür bulunmuştur. Diatom ve dinoflagellatlar her iki örnekleme döneminde baskın organizma gruplarıdır. Fakat dinoflagellat oranının % 35 den 2001-2002 örnekleme döneminde % 41 e yükseldiği gözlenmiştir.

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