

STRUCTURE AND CARBON CONTENT OF DEEP SEDIMENTS OF THE MARMARA SEA

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Abstract

The aim of the study was to determine structure and total organic carbon contents of deep sediments of the Marmara Sea which were not investigated in those depths before. In the study, silt and clay contents were found to be considerably high (Up to 90%) except at stations S1, S7, S21, S26. Total organic carbon (%) values of sediments varied from 0.55 to 4.45 % with a mean of 1.48 % in depths of 500 m, from 0.30 to 1.87 with a mean of 1.24 % in depths of 1000 m. As a result, the deep sediments of Marmara Trough showed the high silt+clay amounts and high concentrations of total organic carbon.

Keywords: Deep sea sediments, Marmara Sea, Marmara Trough, Organic matter

Introduction

The Marmara Sea is an intercontinental sea which connects the Aegean Sea and the Black Sea and covers an area of 11350 km². Its deepest depth is 1390 m [3]. Deepest 3 trenches of the Marmara lay in the northern part of the Sea. Çınarcık Trough is located in the eastern part of Marmara and its deepest depth reach to 1238 m. In the middle there is another trench called Centre Trough with highest depth reaching 1390 m. The third trench is located in the western part with the depth of 1112 m [4]. Although all around the Sea of Marmara were investigated by many scientists, there are no studies conducted in the deep sediments of Marmara Trough which reach 500 – 1000 meters. The aim of the study was to determine structure and total organic carbon contents of deep sediments of the Marmara Sea which were not investigated in those depths before

Materials and methods

The study was performed with R/V Yunus S of Istanbul University around the Marmara Sea between 6.6.2013 and 26.6.2013. 32 deep sea sediments (≥ 500 m) were taken by box corer which samples an area of 0.1 m². Sediment structure was determined according to [1]. Sieve of set of 2 mm, 250 μ , 63 μ and 20 μ were used. Silt and clay are determined together. Organic carbon concentrations were determined according to modified Walkley-Black titration method [2].

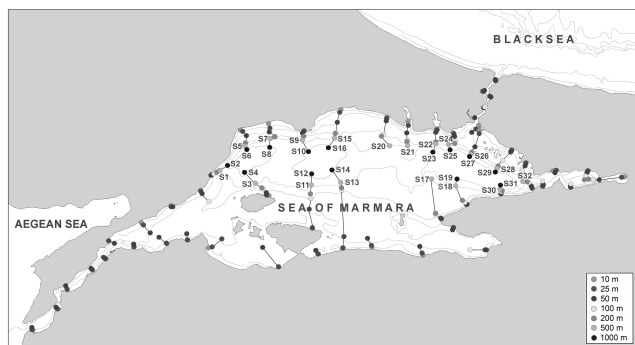


Fig. 1. Map of sampling stations

Results and discussion

The deep sediments of the Marmara Sea are usually rich in mud. In the study, silt and clay contents were found to be considerably high (Up to 90%) except at stations S1, S7, S21, S26. Similar to the present study, high silt and clay amounts were also found in the deep sediments of the Marmara [5]. Total organic carbon (%) values of sediments varied from 0.55 to 4.45 % with a mean of 1.48 % in depths of 500 m, from 0.30 to 1.87 with a mean of 1.24 % in depths of 1000 m (Fig 1-2). Mean of TOC (%) values was higher than the shale average (0.8 %) [6]. It was determined four critical TOC ranges in the Marmara Sea as low (0.1-0.59%), moderate (0.6-1.19 %), high (1.2-2.19%), and very high (2.2 \leq) [7]. When compared with our results, TOC values measured was low at S15, S27; was moderate at S1, S2, S8, S9, S10, S11, S17, S18, S19, S20, S22, S26, S29, S30; was high at S4, S5, S6, S7, S12, S13, S14, S16, S23, S25, S28, S31; was very high at S3, S24, S32. Coarser sediments accumulate near the shore while finer sediments are transported offshore due to waves and currents [5]. As a result, the deep sediments of Marmara Trough showed the high silt+clay amounts and high concentrations of total organic carbon.

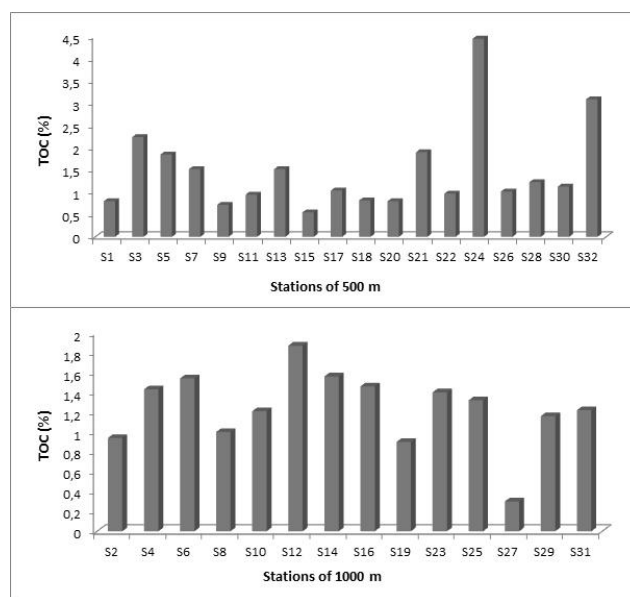


Fig. 2. TOC values of 500m and 1000m stations

Acknowledgment This study was performed within the research project of TUBITAK (Project no: 111Y268). The authors would like thank project team for their invaluable field work.

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