

THE SEA OF MARMARA :
LATE QUATERNARY LITHOFACIES AND PALEOCEANOGRAPHIC EXCHANGE
BETWEEN THE EASTERN MEDITERRANEAN AND THE BLACK SEA

by

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ABSTRACT

A petrologic study of radiocarbon-dated cores in the Sea of Marmara helps elucidate the sequence of paleoceanographic events affecting the Aegean and Black Seas during the Late Pleistocene to the Recent, and explains the marked difference in age between sapropels in the Eastern Mediterranean (about 9,500-7,000 years B.P.) and Black Sea (7,000-3,000 years B.P.).

Water mass exchange between these regions must be considered in terms of (a) physiography (the restricted connections and shallow sills of the Bosphorus and Dardanelles Straits), and the large-scale climatic oscillations which affected (b) eustatic sea level, (c) melting of the Eurasian ice sheet, and (d) the degree of water mass stratification.

Until about 12,000 years B.P. Marmara was a lake, isolated and anoxic, which separated the Black Sea, then in a lake phase, from the marine Aegean.

The much older age of the Holocene Aegean-Levantine sapropel is the result of predominant westward overflow of ice cap melt water moving from the Black Sea to the Aegean from about 12,000 to 7,000 years B.P.

At this time, a two-way flow across the Dardanelles and Bosphorus sills occurred, reflecting the continuing rise in sea level and much diminished fresh water outflow from the Black Sea : the latter records brackish, euxinic conditions leading to sapropel formation ; Marmara bottom waters remained stratified and poorly ventilated, while open marine, well-oxygenated conditions characterized the Aegean.

The present water exchange pattern between these regions was established about 3,000 years ago, and Marmara continues to display a stratified circulation pattern and partially restricted bottom conditions.

Our study confirms that, oceanographically and sedimentologically, the Sea of Marmara is the easternmost branch of the Mediterranean with the Bosphorus Strait serving as the major boundary with the Black Sea.

