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CLIMATIC VARIATIONS DURING SAPROPEL DEPOSITION IN GAVDOS ISLAND, EASTERN MEDITERRANEAN SEA: A KEY FOR UNDERSTANDING FORMATION PROCESSES.

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EXTENDED ABSTRACT

The Neogene eastern Mediterranean record is characterized by the cyclic occurrence of dark, distinct sediment layers with organic carbon contents ranging from a few to almost 30 weight percent. These organic-rich layers, called sapropels, are centimeters to decimeters thick, and they are embedded in light brown to grey hemipelagic sediments. The origin of sapropels is thought to be related to paleoclimatic changes in the Mediterranean area.

One of the very few complete hemipelagic successions in Mediterranean is found in Gavdos Island – Metochia section (SW Crete). Metochia section is a Late Miocene hemipelagic marl succession, characterized by the rhythmic alternations of poorly non-bioturbated brown-grey, organic rich laminated beds (sapropels) and bioturbated, light grey-blue, homogeneous, hemipelagic marl beds. The thickness of successive sapropel and marl beds varies such that distinct small and large-scale clusters can be distinguished.

The purpose of this study is to determine sea-surface condition changes influence on the sapropel formation process in Metochia section. High resolution sea surface productivity and sea surface temperature records are based on the quantitative analysis of planktonic foaraminiferal species recognized in the section, using their present-day habitat characteristics. Planktonic foraminifera are excellent tools to describe past variations in global and regional climate.

The quantitative data from the Metochia section have been processed by spectral analysis using bandpass filter of 21 and 41 kyr components. Spectral analysis was used to verify the periodicity of the relative abundance fluctuations of the planktonic foraminifera. The analysis revealed that variations in sea surface productivity and sea surface temperature are controlled by periodic variations in the Earth's orbital cycles. Sapropels in Metochia section are characterized by increased sea surface productivity and sea surface temperature.

The precession-related variations in sea surface productivity are correlated with the sedimentary cycles suggesting that increased river discharged and shoaling of the pycnocline and the associated intensification of the Deep Chlorophyll Maximum layer.
The precession-related variations in sea surface temperature are correlated to periods of maximum insolation during the Northern Hemisphere summer.

Key words: Late Miocene, planktonic foraminifera, sapropels, Eastern Meditteranean.