

Paleoclimatic conditions during the “warm Pliocene” interval (~4.1–3.2Ma) in the eastern Mediterranean (Cyprus): a combined alkenone and calcareous nannofossil study

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The Pissouri south section (PSS) on the island of Cyprus is correlated with calcareous nannofossil biozones MNN14/15 and MNN16 and is astronomically dated between ~4.1–3.25Ma. Alkenone and nannofossil data from the PSS provided a detailed description of the paleoclimatic and paleoenvironmental conditions during this interval in the eastern Mediterranean. The cyclical lithologic alternations between the organic-rich laminated layers and grey marls of the PSS correspond to the Earth’s orbital precession and reflect the deposition of sapropels in the area. These sapropel events took place under conditions of increased sea surface temperature (SST), enhanced water column stratification, and development of a productive deep chlorophyll maximum (DCM), as evidenced by the dominance of *Florisphaera profunda* (Athanasiou *et al.*, 2015, 2017). Such conditions are triggered by freshwater discharges from the North African margin due to insolation-driven intensification of the African monsoon. The absence of *F. profunda* in Pliocene sapropels from the central Mediterranean highlights the sensitive response of the eastern basin to freshwater perturbations. Comparisons between alkenone and calcareous nannofossil assemblage patterns indicate that *Pseudoemiliana lacunosa* is the main alkenone producer

in sapropel layers, although *Reticulofenestra* spp. contributions should not be overlooked.

This first Pliocene alkenone-SST record for the eastern Mediterranean documents the “warm Pliocene” period (~4.1–3.25Ma), which is characterized by a mean SST of about 26°C. Distinct SST minima at ~3.9Ma, 3.58Ma, and between 3.34–3.31Ma correspond to the MIS Gi16, MIS MG12, and MIS M2 global cooling episodes, which occurred before the onset of Northern Hemisphere glaciation. Our findings imply that the peak of the MIS M2 cooling in the eastern Mediterranean may be up to ~40kyr older than benthic stable oxygen isotope records have indicated.

References

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