



## **Temperature record and sapropel formation during the late Pliocene in central Mediterranean: a multi-proxy approach**

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The late Pliocene (Piacenzian; 3.6-2.6 Myr) in the Mediterranean region is characterized by the deposition of organic-rich sedimentary layers named sapropels. Sapropel formation has been related to the strengthening of the precessionally-controlled African monsoon, triggering enhanced primary productivity and/or improved organic matter preservation. However, the relative importance of surface-ocean productivity versus deep-water preservation for sapropel formation remains a long standing debate among the science community.

Here, we used a multi-proxy approach to characterize long-term environmental conditions and to discuss sapropel formation during the late Pliocene at Punta Grande/Punta Piccola sections (southwest Sicily). Sea and air temperatures were reconstructed using all the lipid biomarker-based temperature proxies currently available: the alkenone unsaturation index (UK'37), the tetraether index (TEX86), the Long-chain Diol Index (LDI), and the degree of methylation/cyclization of branched tetraether (MBT/CBT). Results show that sea-surface temperatures (SSTs) were relatively stable throughout the late Pliocene, but that consistent increases are recorded in most sapropel layers.

SST record was then compared with variations in total organic carbon proportions, lipid biomarkers contents and nannofossil assemblages. Based on these observations, two mechanisms of formation can be inferred for each sapropel. A first series of sapropels is likely due to a better preservation of organic matter, due to the development of a thermohaline stratification of the water column and to oxygen depleted bottom waters. The second series of sapropels is more likely due to enhanced primary productivity in a non-stratified water column.