



Sapropels in the Mediterranean Area: what we can learn from these natural archives

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Sapropels are dark laminated organic- rich sediment widespread in the Mediterranean area whose deposition is related to significant changes in climate, water circulation and biogeochemical cycles. They have been deposited since the late Miocene but become important starting from the Pliocene around 5 Million years ago.

The last 5 Ma of Earth's history includes a shift from global warmth of the early Pliocene to globally cold conditions of the Pleistocene, and therefore provides an opportunity to understand the causes of major climate transitions. This transition included the emergence of the direct ancestors of humankind and contains the beginning of cyclic Northern Hemisphere glaciation. Within the Pliocene episodic climate fluctuations occurred prior to the late Pliocene cooling, and in particular a warm period spanning from 3.3 and 2.85 million years before present. Although this last interval does not represent a direct analog for an anthropogenically warmed climate, we highlight that it can serve as a useful case for understanding warm climates, particularly since many of the boundary conditions (including position of continents, major ocean currents, small northern hemisphere ice sheets, and atmospheric pCO₂) were similar to today.

Starting from the assumption that paleoceanographical research is the only way to investigate Earth System processes that operate on timescales longer than the period of instrumental records, the study of sapropels deposited in areas where the sedimentary rate is high enough to discriminate annual deposition, allows a potential detail that is comparable to instrumental observations.

Since we know that plants and animals respond as individuals to any perturbation

(and not as coherent communities) causing changes in the ecosystems through time in response to environmental stress, aim of this work is to present and analyse the recent multiproxies studies performed in high sedimentary rate sapropels deposited from the Pliocene to the Holocene with these questions in mind:

What can we say about the interaction between geosphere and biosphere during sapropel deposition?

What can we say about how fast have ecosystems responded to sapropel driving conditions?

How can the study of sapropel help to discriminate the influence of humankind on natural processes?