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Geochemical signature of Sapropel S1 on the Cretan Ridge (Eastern Mediterranean).

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The Mediterranean Sea, a complex system subdivided in several basins interconnected by straits and sills, is a natural laboratory for environmental studies. Because of the complex environmental history of the region, many areas of the Mediterranean Sea have experienced variations in their geological setting (e.g., sea level), which, as a feedback, have influenced the oceanography and geochemistry of the whole basin.

The Holocene sedimentary sequences from the Eastern Mediterranean and in particular from the Ionian Sea and Levantine Basin are characterized by the presence, at around 9 ka, of a dark-colored organic rich layer (Sapropel S1) intercalated in normal pelagic sediments. Sapropel deposition is possibly related to significant changes in climate, water circulation and biogeochemical cycling (e.g., Rossignol-Strick et al., 1982; Vergnaud-Grazzini et al., 1977; Hilgen, 1991), and recently, a Black Sea outflow has been considered as the possible cause of the water column stratification that led to bottom water anoxic conditions and formation of Sapropel S1 (around 9 kyr) in the Eastern Mediterranean Sea (Aksu et al., 2002).

The increased interest in sapropel during the last decades has encouraged multi-proxy studies to clarify the processes that induced the deposition of these organic-rich layers. In this study, we plan to analyze sedimentary phosphorus, major and trace elements (using a Micro-XRF) from below and above the sapropel to reconstruct the circulation patterns in the region from 30 ka to the present, including the interval of Sapropel S1 deposition.

For our study, we have sampled Core SIN97 01-GC retrieved on the Cretan Ridge (37˚33.89'N and 17˚46.32'E), which contains a very thick Sapropel S1 (about 15 cm) and will allow a high resolution study of this interval.

Concentration and distribution of phosphorus in the sediments can be used to identify and characterize anoxic sediments, and it has been already used to trace bottom water circulation during the deposition of Sapropel S1 in the Mediterranean Sea (Slomp et al., 2002). Variations in chemical composition shown by XRF analysis can be used to provide useful information about post-depositional oxidation of Sapropel S1, which may be related to diagenetic effects linked to transition between different bottom water oxygenation conditions.

Our preliminary investigation reveals the trend of some elements across Sapropel S1. In particular, the ratio Mn/Al shows a distinct positive peak at the passage from organic-rich to normal marine sediments, as also documented by Thomson et al (1999), which records the post-deposition redistribution of this redox sensitive element.

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