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# Rapid changes in primary productivity and oxygen depletion during sapropel deposition: implications for reconstructing seawater oxygen levels

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The deposition of Organic-Rich Layers (ORLs) and sapropels in the Mediterranean Sea basins represents an exceptional record of severe changes in oxygenation over the recent geological past. Such changes are also associated to rapid productivity oscillations that involved a major increase in export fluxes of organic carbon. These episodes of enhanced production and preservation of organic matter can be used as a natural archive for studying oxygen fluctuations and deoxygenation events, and a better comprehension of the causes and consequences of past events will provide valuable information to further understand oxygen level variations in future scenarios. In general, sapropel deposition has been related to increased productivity and sluggish water circulation in response to African monsoon variability. To further understand how such conditions led to bottom water oxygen depletion, a multiproxy approach, including diverse geochemical and ichnological proxies, has been applied. Obtained results have provided new insights into the relationship between productivity and oxygen conditions in the water column and at the sediment-water interface. Sapropels intervals from cores recovered at four ODP Leg 160 sites were selected across an East-West transect of the Eastern Mediterranean basin entailing diverse depths and oceanographic regimes. At these sites, sapropel layers had been well characterized in terms of productivity (i.e. Ba/Al and TOC), and new analyses have been performed to provide additional redox proxies, i.e. degree of pyritization (DOP), trace elements ratios, and enrichment factors (EF) that have allowed a high-resolution reconstruction of bottom-water ventilation. Also, a preliminary ichnological approach is coupled with the geochemical information to assess the response of the macrobenthic trace maker community to the redox changes at the sediment-water interface. Trace metal proxies indicate a significant, though variable, decreasing oxygenation during sapropel deposition, also supported by important pyritization within sapropel layers.