High resolution record of Holocene riverine and eolian contributions to central Mediterranean sediments

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Alternating depositions of organic-lean marls and organic-rich sapropel sediments in the eastern Mediterranean Sea (EMS) are clearly related to precessional hydroclimate variability. The exact origin for freshwater sources and related changes therein during sapropel formation are still debated. Here, Sr and Nd isotopes and high-resolution elemental ratios from core CP10BC are used to unravel and constrain different riverine and eolian supplies to the central Mediterranean over the past 9.8 ka.

Based on Sr and Nd isotopic and elemental compositions, the detrital sediments in core CP10BC can be explained by a three-endmember mixing system. The three endmember include Saharan Dust, Aegean/Nile, and Libyan Soil, which respectively represents the eolian supply from North Africa, the riverine inputs from the Aegean/Nile areas, as well as the riverine and shelf-derived fluxes from the Libyan-Tunisian margin.

In particular for sapropel S1 time, we find important detrital supplies from paleo river/wadi systems along the Libyan-Tunisian margin, activated by intensified African monsoon precipitation. A west–east comparison of Sr-Nd isotope data between core CP10BC and 4 other cores throughout the EMS shows that, such detrital supplies originated mainly from western Libya and Tunisia, and were transported as far eastward as ~25°E while being diluted by an increasing Nile contribution.

Moreover, elemental proxies (Ti/Al, K/Al, Mg/Al, Y/Sc, Ce/Ni, and Zr/Cr) reflect concordant changes in the three endmembers at high resolution. These indicate that enhanced precipitation and associated detrital fluxes must have occurred not only from North Africa but also from the northern EMS borderlands.