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Eolian and riverine contributions to central-Mediterranean sediments: a high-resolution Holocene record

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Circum-Mediterranean climate variability is reflected in sediments deposited and preserved at the Mediterranean seafloor. 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 eolian and riverine supplies from North Africa and from northern borderlands to the central Mediterranean over the past 9.8 ka.

Based on Sr and Nd isotopic and elemental compositions, the provenance for detrital sediments in the Levantine basin can be adequately described using 2-end-members. However, in the central Mediterranean, a three-endmember mixing system is required. 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, and the riverine and shelf-derived fluxes from the Libyan-Tunisian margin.

For the first time, robust and consistent evidence is given for important riverine supplies from the Libyan-Tunisian margin into the central Mediterranean during sapropel S1 time in particular.

Considerable amounts of detrital materials and freshwater must have been delivered into the EMS through the fossil river/wadi systems, which were 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 $\sim$25°E while being diluted by an increasing Nile contribution. The Nile contribution to the central-Mediterranean detrital sediment fraction appears to have been negligible.

Moreover, elemental proxies (Ti/Al, K/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. Changes in the Libyan-Tunisian riverine contribution show a close correspondence with hydroclimate evolution of NW Libya on the one hand, and with prominent riverine contribution from the northern EMS borderlands on the other (Wu et al., 2016).

Wu, J., Böning, P., Pahnke, K., Tachikawa, K., De Lange, G.J., 2016. Unraveling North-African riverine and eolian contributions to central Mediterranean sediments during Holocene sapropel S1 formation. Quaternary Science reviews 152, 31-48.