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Last interglacial East Mediterranean sapropels: Testing the freshwater hypothesis using coastal proxy records

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Current understanding of sapropel formation in the Eastern Mediterranean suggests a combination of anoxia and enhanced primary productivity. Enhanced anoxia is thought to have resulted from freshwater input into the Eastern Mediterranean most likely originating from the Nile and from wadis draining Saharan lakes. We investigated Mediterranean sediment sequences on the coasts of North Africa and Levant using conventional sedimentological and optical dating techniques in order to understand the coastal response to external forcing when sapropels S5, S4 and S3 formed at ∼125 ka, ∼105 ka and ∼83 ka in various East Mediterranean sub-basins.
The sediment sequences show sharp switches between siliciclastic and carbonate dominated nearshore environment where carbonate-rich sediments are composed of oolitic grainstones. The oolitic sediments represent a period of elevated annual sea-surface temperature and lack of fluvial discharge at ∼113 ka on the Levant coast, at ∼110 ka on the coast west of the Nile delta (El Asmar and Wood 2000) and at ∼80 ka on the north Saharan coast. Both the timing and duration of the arid period are different on each coast owing to the interplay between local processes and external forcing. For the Levantine Sea these differences confirm the dominant role of the Nile discharge in generating conditions for sapropels to form. For the central east Mediterranean the differences indicate dominant external forcing after ∼110 ka, exerted by the Atlantic meridional overturning circulation, because arid shorelines existed contemporaneously with the formation of S4 andS3. While it is hard to find the unequivocal evidence, we feel our data rule out a Saharan lakes source of freshwater for the central East Mediterranean Sea after ∼110 ka and thereby implicitly, a spatial and temporal varying freshwater input.