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Eastern-Mediterranean Deepwater formation during sapropel S1: A high-resolution study of an

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At present, deep-water formation and consequential bottom-water ventilation in the Eastern Mediterranean basin occurs through convection originating from two marginal basins, i.e. the Adriatic and Aegean. In the paleo record, long periods of enhanced deep-water formation have been alternating with shorter periods of reduced deep-water formation. The latter is related mainly to low-latitude humid climate conditions and the enhanced deposition and preservation of organic-rich sediment units (sapropels). Here we focus on sedimentary archives of the most-recent sapropel S1, retrieved from 2 sites directly influenced by deep-water formation.
At the Adriatic site, restricted oxygen conditions have developed rapidly at the beginning of S1 deposition but bottom-water conditions have not persistently remained anoxic during the full S1-interval. In fact, the variability in intensity and persistence of sedimentary redox conditions at the two deep-water formation sites is related to brief episodes of climate cooling (Filippidi et al., 2016). At the Adriatic site, sapropel deposition appears to have been interrupted twice. The 8.2 ka event, only recovered at this site, is characterized by gradually increasing suboxic to possibly intermittently oxic conditions and decreasing Corg fluxes, followed by an abrupt re-establishment of anoxic conditions. Another important event that disrupted sapropel S1 formation, has taken place at ca. 7.4 cal. ka BP. The latter event has been recovered at both sites. In the Adriatic site it is followed by a period of sedimentary conditions that gradually change from suboxic to more permanently oxic, as deduced from the Mn/Al pattern. Using the same proxy for suboxic/oxic sedimentary redox conditions, we observe that conditions for the Aegean site shift to more permanently oxic from the 7.4 ka event onwards. However, at both sites the accumulation and preservation of enhanced amounts of organic matter have continued under these suboxic to intermittently oxic sedimentary conditions. It seems thus, that after 7.4 cal. ka BP sapropel-like surface or deep-chlorophyll-maximum conditions including enhanced productivity continued, whereas bottom-water conditions were at least intermittently oxic. The latter is related to decreasing precipitation, i.e. run-off, and thus a progressive development and deepening of deep-water formation. The shallower Aegean site, would be affected earlier by such deepening ventilation than the slightly deeper Adriatic site. Finally, termination of sapropel S1 formation as deduced from diminished organic matter contents and Ba/Al, appears to have occurred almost simultaneously in the two areas, namely at 6.6±0.3 and 6.3±0.5 cal. ka BP in Adriatic and Aegean sites, respectively.

Filippidi, A., Triantaphyllou, M.V., De Lange, G.J., 2016. Eastern-Mediterranean ventilation variability during sapropel S1 formation, evaluated at two sites influenced by deep-water formation from Adriatic and Aegean Seas. Quaternary Science Reviews144, 95-106. doi:10.1016/j.quascirev.2016.05.024.