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Geochemical and Micro-palaeontological Evidence of a Climatic Perturbation During Formation of the Most Recent Eastern Mediterranean Sapropel

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A combined geochemical and micro-palaeontological study of the most recently-deposited sapropel (S1) from the eastern Mediterranean Sea is reported from two cores in which the S1 sapropel units were rapidly deposited (15 and 20 cm ky-1). Such rapid accumulation rates have largely protected the two S1 units from post-depositional oxidation effects, resulting in well-correlated Corg and Ba/Al ratios profiles, and allowing a high-resolution investigation of conditions before, during and after S1 formation. The cores are from the Adriatic and SE Aegean Seas, and both record a simultaneous diminution in intensity of sapropel development at 7500 conventional radiocarbon years in the middle of S1 times (~9.5 to ~6.0 ky B.P.). This results in a division of both visual S1 units into two approximately equal lobes. Detailed foraminiferal analysis of the Aegean core reveals fluctuations in benthic foraminifera species abundance that indicate anoxic or near-anoxic bottom water conditions during formation of the upper and lower lobes. The central S1 section shows a temporary repopulation by an opportunistic benthic species (G. orbicularis) indicative of improved bottom water oxygen levels. The appearance and disappearance of this species in the central section, and its reappearance just before the end of S1 times, also coincides with increases in abundance of pelagic foraminifera characteristic of cooler surface water conditions, and with local Mn peaks in the sapropel. These features are interpreted as a phase of increased deep-water ventilation and enhanced bottom water O^2 levels in the middle of S1 time. The perturbation may have been initiated by the major cool, dry, Holocene event at ~8 ky B.P. reported from the ice core record by R.B. Alley and expressed globally in many other localities. Although the S1 Corg contents are low at 1-2 wt.% in both cores because of dilution by high detrital fluxes, a set of elements (Ba, Cr, Cu, Mo, Ni, S, Se, U, V and Zn) generally present in other S1 units, older sapropels and black shales, is clearly present at enhanced levels. Sulphur enrichment is well correlated with the Corg content throughout S1, and FeS2 formation accounts for the bulk of the observed S enrichment.