Reconstructing the seafloor environment during sapropel formation using benthic foraminiferal trace metals, stable isotopes, and sediment composition

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Résumé en anglais	The evolution of productivity, redox conditions, temperature, and ventilation during the deposition of an Aegean sapropel (S1) is independently constrained using bulk sediment composition and high-resolution single specimen benthic foraminiferal trace metal and stable isotope data. The occurrence of benthic foraminifer, Hoeglundina elegans (H. elegans), through a shallow water (260 m) sapropel, permits for the first time a comparison between dissolved and particulate concentrations of Ba and Mn and the construction of a Mg/Ca–based temperature record through sapropel S1. The simultaneous increase in sedimentary Ba and incorporated Ba in foraminiferal test carbonate, (Ba/Ca)H. elegans, points to a close coupling between Ba cycling and export productivity. During sapropel deposition, sedimentary Mn content ((Mn/Al)sed) is reduced, corresponding to enhanced Mn2+ mobilization from sedimentary Mn oxides under suboxic conditions. The consequently elevated dissolved Mn2+ concentrations are reflected in enhanced (Mn/Ca)H. elegans levels. The magnitude and duration of the sapropel interruption and other short-term cooling events are constrained using Mg/Ca thermometry. Based on integrating productivity and ventilation records with the temperature record, we propose a two-mode hysteresis model for sapropel formation.
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