Redox conditions in the Black Sea during Eemian and Holocene sapropel formation

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The Black Sea experienced fundamental environmental changes during glacial-interglacial transitions, with sapropel formation after connections to the Mediterranean Sea. While the redox conditions during the Holocene (since ca. 9 ka BP) are relatively well understood, the redox evolution during the last interglacial, the Eemian (128-120 ka BP), remains largely unknown. With its at least 3°C warmer climate and an up to 10 m higher global sea level, the Eemian could open a window into the future development of the Black Sea. Here, we provide a detailed comparison of the redox evolution during Eemian and Holocene sapropel formation. The records of Mo/Al, Re/Mo, and δ^{98}Mo in the Eemian sapropel reveal a textbook-like progressive oxic – intermediate reducing – euxinic sequence with stronger sulphidic conditions than during the formation of the Holocene Unit II sapropel (ca. 8-2.5 ka BP). δ^{56}Fe and the presence of isorenieratene derivatives, with the latter indicative for photosynthetic green sulphur bacteria (*Chlorobiaceae*), suggest a comparatively gradual rise of the Eemian redoxcline up to the photic zone. Higher Mo/TOC ratios and Mo inventory calculations indicate a higher Mo availability during the Eemian, due to elevated supply by Mediterranean waters. We conclude that the combination of higher temperatures, productivity, sea level-associated higher salinity, and corresponding higher sulphide levels were ultimately responsible for higher trace metal enrichment within the Eemian Black Sea sapropel.

Reference:
Wegwerth et al. (2018) Palaeogeogr. Palaeoclimatol. Palaeoecol. 489, 249-260.