Biomarker and trace-element evidences for redox-conditions and productivity during the early Aptian Oceanic Anoxic Event (Carbonero section, southern Spain)

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The early Aptian Oceanic Anoxic Event (OAE 1a) represents a major perturbation in the global carbon cycle and is linked to environmental, biotic and sedimentary changes. This study presents the stratigrahic and geochemical characterization of an expanded pelagic marine section or the OAE 1a from the western Tethys. A multiproxy approach, including C-isotope stratigraphy, biomarkers and elemental geochemistry has been carried out. Our results reveal that the previously defined C-isotope segments 2 to 7 are clearly recorded in the studied section. The biomarker study has shown that organic matter is thermally mature, mostly composed of *n*-alkanes, hopanes, stereranes and isoprenoids, mainly from marine sources. Among the most remarkable findings is the presence of 2-Me-hopanes, which are considered as biomarkers of bacteria, typical of OAEs. Relative abundances of the different biomarkers groups reveals interesting stratigraphic variations: pre-OAE OM is dominated by *n*-alkanes, whereas OAE OM is dominated by steranes and hopanes, and post-OAE OM shows a dominance of hopanes. Redox sensitive trace elements are enriched in some intervals, broadly coinciding with maxima in TOC, pointing to episodic development of anoxia. Collectivelly, biomarkers and trace elements composition indicate that sedimentation took place under generally well oxygenated waters, only punctuated by short episodes of anoxia/dysoxia in a general context of increased primary marine productivity. Our results suggest that organic-rich sedimentation was mostly controlled by high productivity rather than anoxia.

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