The Oceanic Anoxic Event 2 organic record in the South Iberian Paleomargin.

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The Cenomanian—Turonian boundary is marked by one of the warmest periods of the Mesozoic, associated with high $p$CO$_2$ levels and global sea-level highstands. Coupled to these extreme conditions is a massive magmatic episode, the establishment of worldwide marine anoxia, the deposition of organic-rich facies, and perturbations of the global carbon cycle, the so-called Oceanic Anoxic Event 2 (OAE2). In order to define the organic facies variability, this stratigraphic interval was analysed in the Baños de la Hedionda, a reference section positioned in the W part of the Internal Subbetic, representing the sedimentary record of a pelagic plateau located in the most distal part of the South Iberian Paleomargin. Regarding this goal, a high resolution study was developed on the Capas Blancas Formation (Capas Blancas, Black radiolaritic shales, and Boquerón members – Mb.), using organic petrographic and geochemical techniques. Carbon isotopic profile, for the isolated kerogen ($\delta^{13}$C$_{kerogen}$), displays a positive excursion of $\sim2.5‰$ observed in the Black radiolaritic shales Mb., which is in accordance with the worldwide recognized trend for the OAE2 isotopic record.

The pre-OAE2 is represented by the Capas Blancas Mb., with the majority of the samples of this unit showing no organic matter (OM) recovery (0.01—0.57 wt.% total organic carbon; TOC). Palynofacies analysis displayed an association co-dominated by the Amorphous and Palynomorph groups. The Amorphous Group is characterized mostly by marine phytoplankton-derived amorphous OM (AOM), while the Palynomorph Group is co-dominated by freshwater microplankton (Zygmemataceae and Closterium) and choanoflagellates, with some specimens of marine microplankton, sporomorphs, and zoomorphs being also identified. The mixture of freshwater and marine components suggest deposition in a platform environment with shallow depths and oscillating oxygen regimen (oxic to dysoxic conditions). The freshwater components are most likely transported into the marine system due to the lower amorphization state, with the source area being in high proximity.

The OAE2, represented by the Black radiolaritic shales Mb., is characterized by a dominance of: (i) marine phytoplankton-derived AOM; (ii) plate-like bacterial AOM; and, (iii) sheet-like bacterial AOM
with a cratered aspect (0.36—31.48 wt.% TOC). Choanoflagellates (with high degree of amorphization) at the base of the unit, zooclasts, sporomorphs, and solid bitumen are also present. The change in the organic facies suggests the occurrence of a transgressive phase. This organic facies is indicative of a relative sea level rise, with O$_2$ conditions deteriorating with the emplacement of reducing conditions, possibly related to an increase in primary productivity.

The post-OAE2, recognized in the Boquerón Mb., is characterized by a co-dominance of marine phytoplankton-derived AOM and palynomorphs, namely zoomorphs, and high percentages of opaque phytoclasts (below 0.25 wt.% TOC). Nevertheless, kerogen displays a reworked character and, therefore, data should be used with caution.

Furthermore, this study constitutes the first record of Closterium in sediments from the Cretaceous, and the first identification of choanoflagellates, the closest living relatives of Metazoa, in the fossil record.