



The 21st International Sedimentological Congress

A New Journey of Sedimentology: from the Pacific to the Himalaya

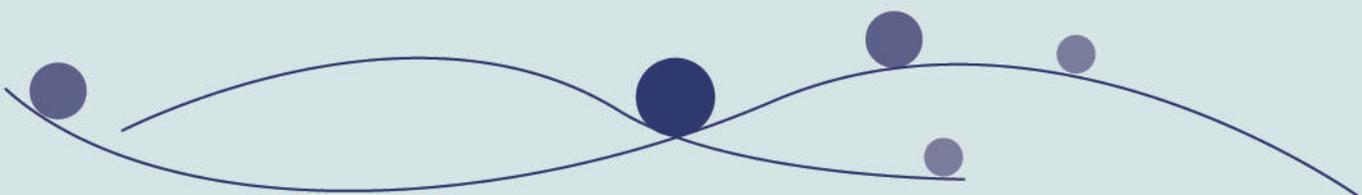
Abstract book





Theme1

Deep-time Climate & Environment



Session T1-9: The Mesozoic-Paleogene hyperthermal events (IGCP739)

Scientific Themes: Theme 1: Deep-time Climate & Environment
Session T1-9: The Mesozoic-Paleogene hyperthermal events (IGCP739)
Presentation Preference: Oral Preferred

Complex environmental perturbations related to the early Aptian OAE 1a – insights from a pelagic succession from the western Tethys (Subbetic Zone, SE Spain)

Cristina Sequero^{1*}, José M. Castro¹, María Luisa Quijano², Roque Aguado³, Ginés A. de Gea¹, B. David A. Naafs⁴, Richard D. Pancost⁴

1. Department of Geology, University of Jaén, Jaén, SPAIN

2. Department of Organic and Inorganic Chemistry, University of Jaén, Jaén, SPAIN

3. Department of Geology, University of Jaén, Linares, Jaén, SPAIN

4. Organic Geochemistry Unit, University of Bristol, Bristol, UNITED KINGDOM

E-mail: cristinasq92@gmail.com

Keywords: Early Aptian Oceanic Anoxic Event, Subbetic basin, accelerated environmental changes, inorganic and organic proxies, local palaeogeography, global anoxic conditions

The early Aptian Oceanic Anoxic Event (OAE 1a) represents a major perturbation in the global carbon cycle associated with a light-carbon input into the climate system, from volcanogenic (Ontong-Java Plateau) and/or methanogenic sources, originating significant environmental, biotic and sedimentary changes. The global signature of this event is a negative followed by a positive carbon stable isotope excursion (CIE), which correlates with the widespread massive accumulation of organic matter in all major ocean basins. Besides the global environmental perturbation that characterizes the OAE 1a, local factors are a key aspect to take into account when discussing the global signals on marine successions. Here, we combine new biomarker and elemental data with published high-resolution C-isotope stratigraphy, TOC content and biostratigraphy from an early Aptian pelagic succession in the western Tethys, La Frontera section (Subbetic basin, SE Spain), in order to provide new insights into the relative roles of variations in terrestrial inputs, primary productivity and degree of oxygenation of marine waters during and after the OAE 1a. This section is further compared with a published equivalent record from a nearby succession deposited on a slightly different palaeogeographic context (Carbonero section), in order to discuss the local vs. global controls on the geochemical signal.

In La Frontera section, analyses of the distribution of selected biomarkers (n-alkanes, acyclic isoprenoids, steranes and hopanes) together with the record of redox-sensitive trace elements, has revealed three intervals of accelerated environmental change that correlate with those previously observed in the Carbonero section. These episodes occurred during intervals of rapid change in the C-isotope values. In La Frontera section, the first episode, which coincides with the negative C-isotope excursion at the onset of the OAE 1a (isotope segment C3), is characterized by a weak deoxygenation and environmental stress. The second episode, which took place at the end of the positive shift globally assigned to the C4 segment, represents the major environmental and biotic perturbation of the succession, with development of anoxia/dysoxia and increased continental inputs and productivity. The third interval of rapid perturbations during the OAE 1a occurred in the lower part of C6 segment, in this case showing a moderate increase in marine productivity, weak development of anoxia/dysoxia and no evidences of increased continental inputs. Despite the correlation of these episodes with those observed in the Carbonero section, interesting differences can be noticed regarding the magnitude of these perturbations. At Carbonero, the three intervals have similar intensity in the geochemical signal, whereas at La Frontera the second episode (C4) shows a signal clearly stronger than the others. These differences can be explained by the effect of the local palaeogeography, with variations in subsidence rates that originated more restricted water circulation at the Carbonero section. However, the major episode of accelerated environmental change recorded at the end of C4 segment in both sites would indicate that this interval represents intensified global anoxic conditions. Interestingly, organic and inorganic proxies in both localities show that environmental perturbations persisted after the OAE 1a, indicating a protracted environmental perturbation in the Subbetic basin.