Geophysical Research Abstracts
Vol. 14, EGU2012-6217-1, 2012
EGU General Assembly 2012

Stratigraphy and geochemistry of an early Aptian carbonate platform: interactions between relative sea level and environmental changes (Prebetic Zone, Spain)

J.M. Castro (1), G.A. de Gea (1), P.A. Ruiz-Ortiz (1), M.L. Quijano (2), R.D. Pancost (3), C. Jimenez de Cisneros (4), and E. Caballero (4)

(1) Departamento de Geología, Universidad de Jaén, Jaén, Spain (jmcastro@ujaen.es; gadegea@ujaen.es; paruiz@ujaen.es), (2) Departamento de Química Inorgánica y Orgánica, Universidad de Jaén, Jaén, Spain (lquijano@ujaen.es), (3) School of Chemistry, Organic Geochemistry Unit, University of Bristol, Bristol, UK (r.d.pancost@bristol.ac.uk), (4) Estación Experimental del Zaidín, C.S.I.C., Granada, Spain (cjimenezdecisneros@ugr.es; caballero@eez.csic.es)

The Early Aptian was a time of development of large shallow carbonate platforms, punctuated with phases of growth crises and platform demise. Much research has been done over the past few years, focussed on characterizing the stratigraphic architecture of carbonate platforms and elucidating the possible link between platform demise and oceanic anoxic events. To explore this, we are investigating the Mariola stratigraphic section (Prebetic Zone, Betic Cordillera), deposited in the Southern Iberian Palaeomargin during the Mesozoic. The Lower Aptian of this section records the installation, development and demise of a carbonate platform, and the subsequent imprint of the OAE 1a. An integrated approach including sedimentology, biostratigraphy, and sequence stratigraphy, along with isotope stratigraphy, biomarker analysis and elemental geochemistry has been carried out.

The studied section is located in the Sierra de Mariola, where the early Aptian succession is composed of three units: (1) The Llopis Fm., made of shallow platform carbonates with rudists, which is organized in a succession of shallowing-upwards parasequences defining a progradational-retrogradational cycle; (2) the Agres bed, formed by bioclastic calcarenites and marls, which represents a significant lithological and biotic change and is interpreted as deposited during a transgressive pulse coeval to a notable terrigenous input into the platform, and (3) the Almadich Fm., made of an alternation of marls and marlstones with planktonic foraminifers and ammonites, interpreted as the result of the drowning of the carbonate platform.

The C-isotope curve shows a negative trend in the upper part of the Llopis Fm. with lowest values within the basal part of the Almadich Fm. This negative peak is followed by a positive shift, recorded within a level of organic-rich marls, considered to be the local record of the OAE1a. Finally, the values decrease through the upper part of the Almadich Fm. TOC values in the organic rich level vary between 0.2-0.6 wt.%. The biomarker characterization of the organic rich level has revealed that the organic matter is very immature and well preserved, and dominated by n-alkanes, with an important contribution of hopanes and minor amount of steranes. The analysis of the distribution of biomarkers suggests that the origin of the organic matter is dominated by terrestrial and marine plants, with a lower contribution of bacteria.

The integration of stratigraphy and geochemistry suggests that the evolution of the early Aptian carbonate platform studied was the result of a combination of relative sea-level changes, leading to the initial progradational phase and the subsequent deposition of parasequences and, on the other hand, environmental changes reflected in the demise of the carbonate platform and the facies and faunal change recorded in the Agres bed. The OEA 1a took place after the drowning event, suggesting that the main environmental changes recorded in this section might be related to a combination of regional processes and the global changes predating and probably triggering the OAE1a.

Acknowledgements: This work is a contribution of the research project CGL2009-10329.