

ENVIRONMENTAL CHANGES DURING THE EARLY CRETACEOUS IN DURLSTON BAY SECTION (DORSET, GB): A MOLECULAR APPROACH

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In numerous tethyan and peri-tethyan settings, the Jurassic/Cretaceous transition is characterised by significant climatic and environmental changes. Latest Jurassic climate was characterised by an episode of relatively cool and arid conditions, which progressively returned to more humid conditions during the Berriasian. This early Berriasian return to more humid conditions is clearly exposed at Durlston Bay section (Dorset, UK), classical type section of the purbeckian facies and highly famous for its fossil content. In its lower part, shallow lagoonal to lacustrine, kaolinite-depleted limestones and numerous evaporites beds indicate deposition under an arid climate. In the upper part, kaolinite-rich clayey limestones, indicate more humid conditions (figure 1A). Numerous other markers, sedimentological, mineralogical as well as biological testify for the environmental change.

Located exactly between the evaporitic and kaolinite-rich facies, Durlston Bay section shows organic-rich levels, which origin is poorly understood. These levels have a high organic content (TOC up to 8%) and the high hydrogen indexes (up to 950 mg HC/g TOC), indicate Type I to II organic matter, consistent with the presence of colonies of the algae *Botryococcus braunii* in the palynofacies. Though the sedimentary facies indicate a marine environment, in particular the clearly marine “Cinder bed”, the presence of the alga *B. braunii* rather indicate an environment dominated by fresh to brackish water.

A biomarker study was performed along Durlston Bay section, in order to better characterise the sources of the organic matter associated with the different climatic/environmental conditions. Surprisingly, the biomarker distribution relatively poorly differs along the section. This is particularly the case for *n*-alkanes (figure 1). Most obvious changes concern the steroids and hopanoids abundance, as well as the presence of a hump of aromatic and/or sulfur-rich compounds (figure 1). Throughout the section, the biomarker content indicate an algal/bacterial organic matter deposited in a non marine environment. Biomarkers associated with evaporitic conditions are also observed in most of the samples. Though the environment was not lacustrine, the facies changes and biomarker contents in Durlston Bay section are best explained by the transition from an underfilled system to an

overfilled system, according to the model developed by Bohacs *et al.* (2000) for lakes. The organic-rich episode would therefore correspond to a balanced-filled system, when conditions were neither too dry nor too wet to allow organic matter preservation.

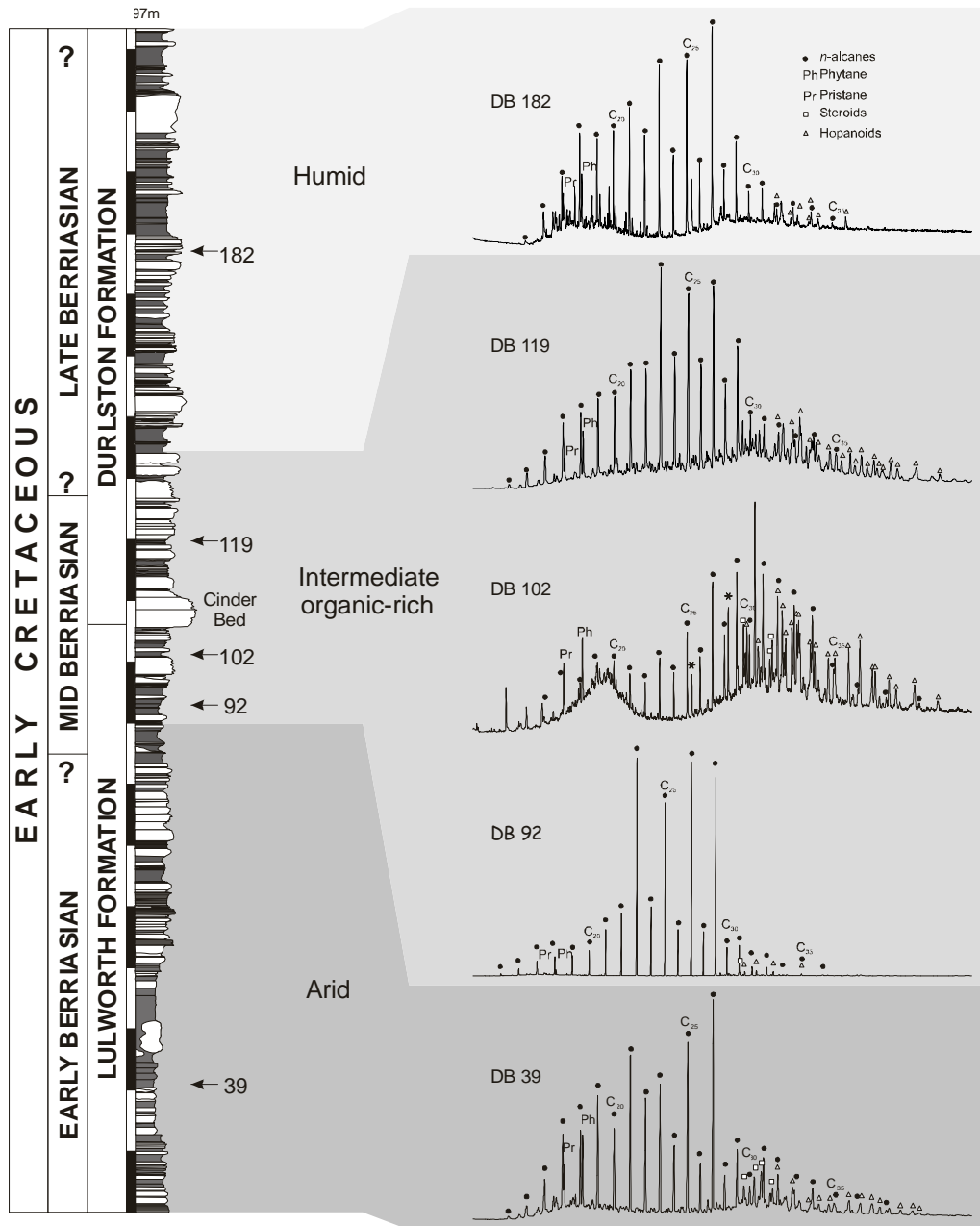


Figure 1. Left: Stratigraphic log of the Durlston Bay section and climatic intervals. Right: selected chromatograms of the polar fraction from sediments extracts.

REFERENCES

- Bohacs, K.M., Carroll, A.R., Neal, J.E., Mankiewicz, P.J., 2000. Lake-basin type, source potential, and hydrocarbon character: an integrated sequence-stratigraphic-geochemical framework. *In: Gierlowski-Kordesch and Kelts (Eds) Lake Basins through Space and Time*, AAPG Studies in Geology, 46, pp. 3–34.