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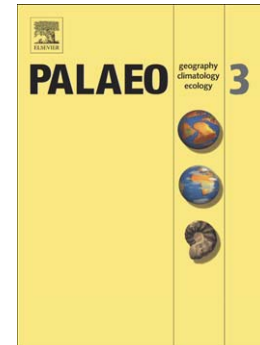
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Maurits Horikx, Stefan Huck, Thierry Adatte, Ulrich Heimhofer

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Vegetation dynamics, angiosperm radiation and climatic changes in the Lusitanian Basin, Portugal during Albian times

Maurits Horikx¹, Stefan Huck¹, Thierry Adatte², Ulrich Heimhofer¹

¹Institute of Geology, Leibniz University Hannover, 30167 Hannover, Germany.

²Institute of Geology and Palaeontology, University of Lausanne, 1015 Lausanne, Switzerland.

1. Abstract

The mid-Cretaceous is characterised by significant evolutionary changes in terrestrial ecosystems. During this period, the typical vegetation consisting of ferns, conifers and other gymnosperms was replaced by an angiosperm-dominated flora. Long ranging and continuous records from the continental realm are mostly lacking due to the prevalence of sedimentary gaps. Here a comprehensive palynological and clay mineralogical dataset covering early Albian to early Cenomanian strata from the shallow marine São Julião section (Lusitanian Basin, Portugal) is analysed to reconstruct the vegetation composition as well as climate and weathering conditions in the continental realm. The palynological assemblage is dominated by non-saccate *Classopollis* and *Inaperturopollenites* gymnosperm pollen with low abundances of spores and angiosperm pollen. The clay mineralogical data is mainly composed of kaolinite and mica and shows two conspicuous intervals of high kaolinite abundances in the late Albian. Based on the ecological preferences of the associated parent plants of the spore-pollen assemblage, a gradual relative temperature increase is inferred in the hinterland of the Lusitanian Basin during the early Albian to early Cenomanian interval. The clay mineralogy and palynological record show that the climate in the continental hinterland of the Lusitanian Basin was semi-arid to sub-humid and punctuated by two distinct humid phases during the late Albian. Multivariate statistical analyses and a comparison with the nearby Guincho section demonstrate the significance and reproducibility of the spore-pollen record. Furthermore, the palynological assemblage implies that angiosperms and ferns occupied similar palaeo-ecological habitats, namely as understorey in Cheirolepidaceae, Araucariaceae and Cupressaceae conifer-dominated forests.

Keywords: Albian, Iberian Peninsula, palynology, clay mineralogy, weathering index, angiosperms

2. Introduction

In the course of the mid-Cretaceous, the existing pattern of terrestrial biome composition and plant community structure experienced a dramatic transformation associated with the radiation and diversification of angiosperms. The rise of flowering plants to ecological dominance during the Albian-Cenomanian coincided with a dramatic drop in the diversity and abundance of many gymnosperm and pteridophyte lineages (Lidgard and Crane, 1988; Crane and Lidgard 1989; Lupia et al., 1999). Based on quantitative analysis of macrofossil floras from Northern Hemisphere sites spanning the Late Jurassic to Palaeocene interval, Lidgard and Crane (1988) show a marked decline in cycadophyte and

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