

Divergent response of the neritic carbonate factory to environmental changes during the Early Bajocian Event

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The Early Bajocian witnessed a global environmental perturbation, characterized by faunal and floral turnovers and a positive carbon isotope excursion. In Italy, this environmental perturbation coincided with an eutrophication event and a carbonate crisis, but this has so far not been adequately reported from other settings, leaving doubt about the extent and nature of these phenomena. Here, we are reporting on an extensive neritic carbonate factory demise that occurs in the upper Lower Bajocian of the Central High Atlas of Morocco, more precisely in the upper Propinquans – lower Humphriesianum Zones. This demise coincided with the acme of the global carbon isotope perturbation, recorded by a 3‰ positive carbon isotope excursion in the bulk organic matter of Morocco. Recovery of the neritic carbonate system occurs during the Early to Late Bajocian transition. The duration of the neritic carbonate factory demise was therefore in the order of 1 Myr. Furthermore, we observe that the Lower Bajocian of Morocco is relatively enriched in arenitic siliciclastic deposits, suggesting increased weathering and nutrient levels along the northwestern margin of Africa during the Early Bajocian. However, comparison with neighboring European basins highlights the non-uniqueness and different timing of the response of shallow-water carbonates to the Early Bajocian environmental perturbations, as some regions present no sign of carbonate factory crisis. Hence, we postulate that local factors were important in mediating the response of neritic carbonate factories to this global environmental perturbation. We notably highlight the role of large Early Bajocian sea-level fluctuation as a trigger for carbonate factory change and demise in Morocco. Indeed, in the Central High Atlas Basin, transgressive intervals are seeing the development of a mud-dominated carbonate factory whereas regressive intervals are associated with grain-dominated carbonate factory. We speculate that the combination of high subsidence rates in the Central High Atlas Basin with large eustatic sea-level rise and high nutrient levels during the Early Bajocian stressed the mud-dominated benthic carbonate factory beyond a critical threshold, explaining the regional demise event.