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Community replacement instead of drowning: Evolution of proto-North Atlantic carbonate-platform production in the run-up to of the Early Aptian OAE1a

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In the proto-North Atlantic realm (Lusitanian Basin, Portugal), carbonate platform production witnessed a major biotic turnover during the Early Aptian. Here, Urgonian-type rudist-nerinid dominated limestones were replaced by an orbitolinid-rich, oyster and serpulid-bearing marly facies. Integrated biostratigraphic-chemostratigraphic studies (Burla et al., 2008; Huck et al., 2012) provided evidence that this change coincides with the Early Aptian carbonate platform drowning episode in the run-up of oceanic anoxic event (OAE) 1a (transition D. forbesi to D. deshayesi ammonite zones), which has been recorded, from many localities in the Tethyan Ocean (Godet, 2013).
Unlike Helvetic and Arabian carbonate platforms, which are characterised by a punctuated mass occurrence of orbitolinids marking the onset of the Aptian (Rawil and Hawar members, respectively), orbitolinids are an abundant constituent of the proto-North Atlantic carbonate platform community from the Late Barremian onwards. Orbitolinid-rich packstones and marls showing mass-occurrences of orbitolinids indicate repeated short-term installation of specific environmental conditions (eutrophication and/or deepening).
In order to critically assess the influence of regional palaeoenvironmental against global palaeoclimatic and palaeoceanographic changes on the Proto-North Atlantic carbonate platform evolution, several outcrop successions in the Lusitanian Basin covering the critical interval have been investigated in detail with regard to facies and petrographic characteristics and geochemical (C-/O-isotopes, P content, bulk-rock and clay mineralogy,) inventory.

The aims of the present study are three-fold: (1) to characterise proto–North Atlantic Lower Aptian shallow-water carbonates with respect to diagenetic history, microfacies, and distribution of fossils useful for the analysis of palaeoenvironments (corals, rudists and orbitolinids); (2) to evaluate the influence of sea-level and humidity changes (palaeonutrient fluxes) on the carbonate platform ecosystems, with special focus on the transition from Urgonian-type rudist-nerinid towards orbitolinid-oyster-serpulid dominated limestones; and (3) to compare the considered proto-North Atlantic platform evolution with the coeval punctuated carbonate platform breakdown as observed along the Northern Tethyan margin.

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