Disentangling the control of tectonics, basement structure, eustasy, and environment on shallow-marine carbonates: the Aalenian–Oxfordian platform of western France

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Deciphering the respective influence of tectonism, eustasy, and paleoenvironmental conditions on carbonate platform architecture, growth, and demise, and on facies distribution and composition is still challenging. To improve our understanding on processes controlling changes in the architecture and facies of intracontinental carbonate platforms we examined the facies and sequence stratigraphy of Aalenian to Oxfordian limestones of western France. Seventy-seven outcrop sections were studied and thirty-one sedimentary facies identified in five depositional environments ranging from lower offshore to backshore. Platform evolution was reconstructed along a 500 km cross-section. Twenty-two depositional sequences were identified for the entire western France platform. They could be correlated with European third-order sequences at the biozone level, demonstrating that eustasy was the major control on the cyclic trend of accommodation. The tectonic subsidence rate was computed from accommodation measurements from the Aalenian to the Oxfordian in key localities. Tectonism controlled the sedimentation rate and platform architecture at a longer time scale; it also triggered two major phases of rise and fall in carbonate production. Topography of the Paleozoic basement acted as a major control over lateral variations of paleodepth within the western France platform until the mid Bathonian. Uplift is recorded from the mid Aalenian to the early Bajocian, corresponding to the mid-Cimmerian unconformity. The occurrence of heterozoan facies in Caen during the Bathonian, whereas photozoan producers dominated in the southern part of the platform, is interpreted as a consequence of 5° C lower seawater temperatures. The demise of carbonate production at the Bathonian/Callovian boundary was initiated by sharp tectonic subsidence coupled with the eutrophication of neritic environments. This demise persisted until the mid Oxfordian due to a global sea-level rise combined with eutrophic conditions. The recovery of the carbonate platform from Caen to Le Mans during the mid Oxfordian was triggered by uplift. This work highlights the multiple factors that control the growth and demise of carbonate platforms as well as the major role played by tectonism in intracontinental basins.

Mots-Clés: carbonate platform, facies, sequence stratigraphy, tectonics, Jurassic, France

The long climatic sequence of Acigol Lake, NW Turkey: first chronological and palynological results

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A 601 m long core was drilled in the Lake Acigöl located in an extensional basin in SW Anatolia (Turkey). The alternation of carbonates relatively rich in evaporites, siliciclastic particles and fossils (ostracods, gastropods and bivalves) gives to the sequence a high potential for palaeoclimatic record.
Preliminary sporo- pollinic and NPP (Non Pollen Palynomorphs) based on five samples analysed between 571 m and 275,2 m depth show high values of steppics and/or halophytic herbaceae except in the sample 514,7 m where Mediterranean *Pinus* dominate. Occurrences of *Abies*, *Cedrus* and *Picea* are also noted. These taxa are accompanied with oak woodland trees (deciduous and evergreen *Quercus*, *Prunus*, *Corylus* and *Acer*) and those living in riparian gallery forests (two types of *Alnus*: *A. glutinosa* t. and *A. viridis* t.). Among herbaceae, plants from open and more or less arid environments dominate the assemblages (e.g. Chenopodiaceae, *Atriplex*, various Compositae, *Calystegia*, *Convolvulus*, *Linum*, *Plantago*). Various coprophilous fungi spores are recorded, in particular in the lowermost sample (571 m), *e.g. Sporormiella*, *Podospora*, *Delitschia* and *Valsaria variospora*. These fungi are reliable indicators of the local presence of large herbivorous mammals. A fauna of large mammal was present during the early Pleistocene in the Acigol lake region according to the literature (Alcicek et al., 2013; Demirel and Mayda, 2014).
The Acigöl sequence is younger than 3.4 Ma, the oldest age determination recorded for lacustrine successions elsewhere in SW Anatolia (van den Hoek Ostende, 2015). The first paleomagnetic investigations show numerous reverse polarities implying that two third of the sequence is older than 0.78 Ma (Brunhes/Matuyama transition) with a base dating back to 1.7 Ma or more.
Indeed, although Jaramillo subchron (from 0.9 to 1.06 Ma) is well recorded, uncertainty remains for the Odulvaï subchron (from 1.78 to 2 Ma) which is not yet robustly identified. The age model will be soon completed by radiometric dating of a tephra found in the sequence and by authigenic 10Be/9Be dating. Detrital proxies (such as magnetic susceptibility) versus biological proxies will allow discrimination between tectonic and climatic signals and may reveal the response of terrestrial ecosystems to the mid-Pleistocene climatic transition. This research is supported by a two-year bilateral cooperation between CNRS-INSU and TUBITAK (grant number 114Y723).

Mots-Clés: Quaternary, pollen, palaeoenvironments, palaeoclimates, geochronology, biostratigraphy