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Tracking the fluvial–marine transition within the Lower Cretaceous of the Sahara platform (Africa): Shifting the continental intercalaire paradigm

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The siliciclastic-dominated Lower Cretaceous deposits of the Sahara platform (North Africa) have long been thought to be entirely deposited in a continental (fluvio-lacustrine) setting ended by the marine flooding associated with the widespread Cenomanian transgression. This notion was based on relatively few and disparate sedimentological studies, leading to a platform wide grouping of the Upper Jurassic/Lower Cretaceous in the "continental intercalaire" or "Nubian Sandstone" concept. A first break-through of this paradigm was introduced by the discovery of brachiopods within the Aptian of South Egypt during the early 80's. More recently, field-work in South-west Libya (Jebel Messak) has also identified repeated tidally-influenced intercalations within fluvial deposits capped by a shallow-marine interval. These strata are recorded ca. 600 km south of previous interpretations of the Early Cretaceous palaeo-coastline and raise the possibility of an epeiric sea covering much of modern day northeastern Algeria, Libya and Egypt.

Although no firm dating has yet been achieved lithological correlation with Lower Cretaceous deposits throughout North Africa and available palynological dating indicates that this major marine flooding is most likely of Early Aptian age and thus may be synchronous with the Oceanic Anoxic Event (OAE) 1a. This raises the question of the effect of such a large tropical shallow-water masse on the OAE 1a event via the possible change of hydrological cycle and reworking of nutrients from previously-exposed land.

This long-term change from fluvial to shallow-marine deposits, punctuated by several short-term fluctuations, offers also an outstanding case study for tracking the fluvial–marine transition and its significance to fluvial sequence stratigraphy on a shallow-dipping platform context. Thus, a tripartite division characterizes the basal short-term transgressive-regressive cycles with amalgamated channels at the base and non-amalgamated, mud-dominated, sequence at the top, locally separated by lenses of tidally-influenced deposits. These lenses therefore mark the maximum flooding intervals of the short-term cycles and the longer term MFZ is recorded within the overlying shallow-marine sequence. Further investigations are needed to quantify the amplitude and duration of these short-term cycles, and notably their significance with regards to the existence, or not, of glacio-eustatic control during that time.