Upper Cretaceous paleoenvironments in the Termit Basin, Niger

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Upper Cretaceous mudstones are the most important source rocks in the Termit Basin, SE Niger. For this study, 184 mudstone samples from the Santonian-Campanian Yogou Formation and the underlying Cenomanian-Coniacian Donga Formation from eight wells were analyzed on the basis of palaeontological, petrographical and geochemical data, the latter including the results of biomarker and stable isotope analyses. Samples from the upper member of the Yogou Formation contain marine algae and ostracods together with freshwater algae (Pediastrum) and arenaceous foraminifera, indicating a shallow marine to paralic depositional environment with fresh- to brackish waters. Terrestrial pollen and spores are common and of high diversity, suggesting proximity to land. Samples from the lower member contain marine algae and ostracodes and arenaceous foraminifera without freshwater algae, indicating a shallow-marine, brackish-water setting. Terrestrial pollen and spores are common in the lower member but are reduced in both diversity and abundance compared to the upper member. This may reflect a reduced rate of terrigenous input, perhaps due to deepening or more offshore conditions.

The Pr/Ph ratio is widely used as an indicator for the redox potential of the depositional environment [1] [2]. Gammacerane is an indicator for water column stratification, which commonly occurs in hypersaline settings [3]. The gammacerane index is used to measure the relative prominence of gammacerane. The wide range of gammacerane index (gammacerane/C_{30} hopane) (0.07-0.5) and Pr/Ph ratios (0.63-4.68) in samples from the upper member of the Yogou Formation suggest a low to moderately saline environment with oxic to anoxic conditions. In samples from the lower member, the narrow range of gammacerane index (0.23~0.35) and Pr/Ph ratios (0.76-1.36) probably indicate a moderately saline environment with suboxic to relatively anoxic conditions.

[1] Powell et al.. (1973) *NPS*, **243**, 37-39. [2] Didyk et al.. (1978) *Nature*, **272**, 216-222. [3] Sinninghe et al.. (1995) *GCA*, **59**, 1895-1900.