

Geochemistry of Upper Cretaceous source rocks and oil-source correlation in a sequence stratigraphic framework in the Termit Basin, Niger

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The Upper Cretaceous Yogou Formation (K_{2y}) is the principal source bed in the Termit Basin (Niger). Three third-order sequences (i.e. SQ1, SQ2 and SQ3 from bottom to top) within K_{2y} were further divided. A total of 35 mudstones from K_{2y} and 25 oils from Eocene Sokor Formation were geochemically analyzed. This study attempts to investigate the abundances and types of organic matter and reveal the biomarker compositions under a sequence stratigraphic framework.

The TOC content of SQ2 and SQ1 source rocks ranges from 0.76% to 1.69% with mature to high mature thermal evaluation stage (R_o : 0.70%~1.30%). While the TOC content of SQ3 source rocks is much higher (1.11%~6.63%) with a relatively low maturation levels (R_o : 0.60%~0.90%). All source rocks are dominated by type II-III kerogen.

The SQ3 source rock is typically characterized by relatively higher Pr/Ph ratio, higher abundances of dibenzofurans and lower value of gammacerane index indicating a suboxic transitional environment, and the relatively higher values of oleanane index, C₂₄TeT/(C₂₄TeT+C₂₆TT) and TDE-1 (1,2,5-/1,2,4-TMN) ratios reflecting a significant terrigenous organic matter input. Conversely, the SQ2 and SQ1 source rocks have lower Pr/Ph ratios, higher content of gammacerane and dibenzothiophenes suggesting an anoxic marine depositional environment, and low values of oleanane index, C₂₄TeT/(C₂₄TeT+C₂₆TT) and TDE-1 ratios indicating predominant algal organisms input.

The results of oil-source correlation show that the discovered oils are dominantly derived from SQ2 and SQ1, with minor contribution of SQ3.