

Predicting Hydrocarbon Charging History and Oil Migration Pathway by Biomarkers in Termit Basin, Eastern Niger

J.Zhao¹, M.Li²

¹University of Regina, Canada

²China University of Petroleum-Beijing, China

Termit basin, located in southeastern Niger, is a Mesozoic-Cenozoic continental rift basin in West and Central Africa Rift System. A little commercial oil was discovered except the Paleogene Dinga faulted terrace in Termit basin during about forty years from 1970. The position of hydrocarbon kitchen, the oil migration pathway, the hydrocarbon charging history of Petroleum Systems in Termit basin are urgent issues for further exploration outside the Paleogene Dinga faulted terrace. To figure out these problems, oil-source correlation based on biomarker parameters of special polycyclic aromatic hydrocarbons were used to confirm the constituent of petroleum systems, and homogenization temperatures of fluid inclusions combined with burial-thermal history of individual well were taken to define the hydrocarbon charging time of reservoirs, and 2,4-/1,4-dimethyl-dibenzothiophene with other oil migration tracers were used to trace the oil migration pathway and the location of hydrocarbon kitchen of petroleum systems.

Results show that oil samples in the Termit Basin can be divided into two oil families, and the first family mainly come from the source rocks of Yogou Formation, and the second family are from source rocks of Sokor Formation. Reservoirs of Sokor Formation from well Agida-2 and Goumeri-2 and Yogou Formation from well Koulele D-1 have been once charged during 8~2Ma and 4~0Ma respectively. The absolute content of the methyl-dibenzothiophene decreases gradually with the migration distance increasing. In conclusion, petroleum systems in Termit basin include Sokor-Yogou(!) and Sokor-Sokor (!). The oil charging of petroleum systems occurred in Late Miocene to Late Pliocene(8~2Ma) and Early Pliocene Quaternary(4~0Ma). The 2,4-/1,4-DMDBT can be used as an effective geochemistry parameter for tracing oil charging pathway and predict the location of hydrocarbon kitchen. The general orientation of oil filling is from the southeast part of Moul Sag to its surrounding. Therefore, it can be predicted that the source kitchen of Termit basin should be in the southeast part of Moul Sag.