

Geological Modeling of Complex Fluvial lacustrine System, Case Study from Oil Field Central Muglad Basin – Sudan

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Sudan is the largest country in Africa with an area of 2.5 million Km² and common borders to eight countries. Muglad Basin is a northwest-southeast trending rift Basin in Central Sudan. Blocks 1, 2 and 4 lie in the Central part of this Basin. Greater Nile Petroleum Operating Company operates these Blocks. Muglad Basin is characterized by more than 15000 m of non marine clastic sediments; these clastic sediments in the study area are likely to be sourced by northern and eastern paleo-highlands.

The combination of both continental (reservoir) and lacustrine (seal / source) rocks in conjunction with the tectonics has created favorable juxtaposition of source, reservoir and seal.

The area of study has been relatively presented itself as a technical challenge to the operating company. A team from Greater Nile Petroleum Operating Company (GNPOC) and Sudapet has conducted geological modeling for the three main Upper and Lower Cretaceous reservoirs, namely the Aradieba, Bentiu and Abu Gabra Formations.

The study comprised a 3D stratigraphic ,facies and structural model building for the key horizons using Petrel Software to capture reservoir variability. Seismic attribute gave a clear expression of faulting and shows that all the productive wells were located on a low frequency and low to high amplitude. The core data used in this study were correlatable with the Petrophysical interpretation models. This oilfield has a multi-oil-water contact.

The petrophysical properties were modeled constrained by facies. The static model identified sand bodies architecture that gave an increase in both oil originally in place (OOIP) and estimated ultimate recovery (EUR).