

Sequence Stratigraphy of Paleogene Samaa, Yabus and Adar Formations, Rawat Rift Basin, White Nile State, Sudan

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ABSTRACT

The purposes of this study are to establish the sequence stratigraphic framework and understand the basin evolution of the Samma, Yabus and Adar Formations (Tertiary age) , south east Sudan. A 3D seismic data, integrated with well logs and FMI, of 5 exploration wells permit recognition of the sequences and the stratigraphic framework of the third rift phase in the Rawat Basin. Based on the GR log motif and FMI data, nine lithofacies associations have been detected in the three formations. The main depositional environments in Samma Formation are alluvial fan, fluvial, shoreface and shallow lacustrine. Yabus Formation is interpreted to be deposited in fluvial and deltaic environments while Adar Formation was deposited in marginal and open lacustrine environments. The sequence stratigraphy interpretation is accomplished in term of three sequence orders which are second order super sequence, second order and third order. The depositional environments are associated with system tracts within the identified sequences. The low stand system tract in the second order super sequence is dominated by alluvium fan sandstone. The Transgressive system tract is mainly composed of lacustrine shoreface, shallow lacustrine, and fluvio- deltaic deposits whereas the high stand systems tract is characterized by semi deep lacustrine and shallow lacustrine deposits. The interpretation of 3D seismic data, revealed four continuous reflectors corresponding to the bottom Samma sequence boundary, the top Samma Transgressive surface, the maximum flooding surface of Adar and the sequence boundary of Adar formation. Four seismic facies have been detected from the seismic facies analysis which is supported by different seismic attributes. Episodic tectonic movements and climate changes were identified as the principal factors that controls the development of the studied sequences. The balance between the tectonic subsidence and the sediment supply controlled the type of the lake Basin. The findings of this study indicate that this basin was an over-filled basin in the early Paleocene of the Samma Formation and evolved into an under-filled basin at the early Oligocene Adar Formation. The most favorable sandstone reservoirs are developed in fluviodeltaic environment in the Yabus Formation which is capped by the high stand semi deep lacustrine environment in the Adar Formation.