
Sequence Stratigraphy, a Predictive Tool to Understand Interplay of Basin Tectonics and Sedimentation: a Case Study from Muglad Basin, Sudan

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Muglad and Melut basins represent the major rift basins in Sudan. These basins meet at an angle of about 45° in south Sudan and terminate against the Central African Shear Zone (CASZ). From the upper Jurassic/Early Cretaceous to Present, a complex system of connected rifts extending from Nigeria to Kenya, has recorded the complex history of South American, African, and Arabic plate interactions. These rifts recorded very thick sedimentation in Muglad basin essentially during Cretaceous and Tertiary. The analysis of these sediments through sequence stratigraphic approach, integrating biostratigraphy and sedimentological studies led to understanding of processes operative during the sedimentation and control of tectonics on sedimentation. These studies identified three mega rift cycles, each followed by thermal contraction and sag phase. During rift phases typical argillaceous facies were deposited mainly in lacustrine environment giving rise to source rock while during sag phase dominantly arenaceous facies provided reservoir and seal facies. The unconformity, subaerial exposure of these reservoir facies moderated the porosity in meteoric and vadose zones while proximity of provenance is detrimental in quality of reservoir facies. Tectonics and syn-sedimentary faulting provided the much sought after accommodation space, and juxtaposition of porous horizon against a seal on footwall is most favored structural style. Parasequence analysis of well logs indicated various reworked horizons where mixing and erratic occurrence of older flora with systematic occurrence of younger floral assemblage created a confusion in establishing stratigraphy at well level, by correlating the Parasequence and building the sequence stratigraphic model of the sedimentation authors provide a lead to understand interplay of tectonics and sedimentation and areas for extensive exploration to hit stratigraphic traps was identified.
