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The Stratigraphy of the Oligocene to Miocene Malembo Formation of the Lower Congo Basin, Offshore Angola

A stratigraphic framework based on the detailed integration of well data and regional seismic stratigraphy, seismic facies analysis and biostratigraphy is presented for the Oligocene to Miocene Malembo Formation of the Lower Congo Basin. The Malembo Formation was deposited in a deep-water slope environment characterized by hemipelagic shales, with generally E-W trending confined to distributary deep-water systems. The extensive 3D seismic data (~20000 km²) and ~50 well penetrations are coupled with high-resolution biostratigraphy to provide a comprehensive dataset covering a significant portion of the Lower Congo Basin.

The Malembo Formation contains several low frequency megasequences (3-10 M.y.) characterized by sand-prone lowstand deposits and shale-prone abandonment deposits that can be mapped regionally within the basin and control the major reservoir and seal play elements. The megasequences are in turn composed of composite sequences (0.5-3 My) and high frequency sequences (0.1-0.5 My) that control lithofacies type, reservoir distribution and reservoir architecture within the deep-water systems. The Oligocene to Miocene reservoirs contain both turbidite and debris flow deposits that display an overall fining-upwards succession from gravel-dominated in the Oligocene, mixed gravel and sand in the Early to Middle Miocene and fine to medium-grained sand in the Late Miocene.

The Malembo Formation is presented with eight new members where each member contains one to four composite sequences. The framework promotes internal consistency and provides a basis for a more detailed regional understanding of the Oligocene to Miocene succession. The relative importance of semi-regional seals and reservoirs is an important aspect of both exploration, development and future production geology.