

3D Visualization of Turbidite Reservoir Architectures, Lower Congo Basin, Offshore Angola

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Significant oil discoveries in Tertiary turbidite reservoirs occur in an unconfined slope setting in the Lower Congo basin. The architecture of these reservoirs reflects deposition across an above-grade and terraced slope where high rates of sediment flux exceed local basin subsidence. The nature of the reservoir sequences varies with slope topography.

Sheet sands occur across terraces or shallow depressions on the slope. The terraces and depressions form where the rate of salt-withdrawal is high relative to sediment flux resulting in deposition of thick, sand-rich channelized fans. Once the depressions fill, channels cut these ponded-fans. Straight and low-sinuosity channels form where the sea-floor gradient is high. High degree of flow confinement in incised low-sinuosity channels promote deposition of sandy debris flows and deposition of high net-to-gross reservoir sands. Highly sinuous bypass channels occur across lower gradient steps on the slope profile. These channels occur as solitary elements, but more commonly form semilinear, partially confined submarine "meander belts" consisting of amalgamated channel sands, sandy debrites interbedded, and overbank sands and mudstones. With progressive infill of the valley, confined turbidite flows evolve to unconfined flows resulting in deposition of localized sheet sands.

Detailed 3D visualizations and seismic attribute extractions reveal stratal geometries of individual reservoir complexes and reveal their depositional history. Detailed, prospect specific observations combined with regional data constrain conceptual reservoir models. Recent drilling in the Lower Congo Basin have confirmed the applicability of these models and provide important calibration data to further reduce reservoir uncertainty in turbidite complexes.