The Neogene Succession of the Lake Albert Rift, Uganda - Challenges and Opportunities

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The Albertine graben forms the northernmost western branch of the East African Rift system, stretching 550 km along Uganda's western border from Rwanda in the south to the Sudanese border in the north. The Lake Albert sector is about 40 km across and over 200 km long, much covered by the lake itself, and flanked on both sides by basement rocks rising to over 1000 m in the DRC to the west. The area has long been known for its oil seeps, but only in the last 10 years, with the drilling of 33 successful exploration wells, has the petroleum potential of this Neogene province been clearly demonstrated.

Modern lithostratigraphical schemes for surface exposures were established by the Uganda Palaeontology expeditions from 1985 to 1992, with correlations using established mammalian and molluscan biostratigraphies and absolute ages based on tephrostratigraphical comparisons of tuffs to the volcanogenic successions of Ethiopia and Kenya. The UPE work suggested deposition of up to 6 km of sediment in the central graben, starting from about 12-13 Ma in the middle Miocene. Most hydrocarbons have been found to date in perched terraces on the graben's eastern margins, where deposition apparently started later, at about 7-8 Ma in the late Miocene. These discoveries may form the basis for early production schemes, with estimated reserves of over 2,000 mmbo. Exploration has barely touched the deeper and more central parts of the basin as yet: additional major discoveries can be expected in coming years.

A practical stratigraphical framework is needed to facilitate more targeted exploration and to enable reliable resource assessments of the entire basin. Surface and subsurface data have only recently been integrated into a single coherent model, while palynostratigraphical dating of wells has also been challenging. Re-analysis by PEPD has however given significant new stratigraphical insights. The interplay of lacustrine and alluvial environments, with varying subsidence, tectonism and ancient lake levels all affecting axial and marginal input to the basin, has resulted in a complex stratigraphical scenario, where correlation between surface and subsurface is not always immediately evident. Better understanding of numerous ironstone horizons, some providing characteristic markers in the surface and subsurface, and systematic use of tuffs to establish a more sophisticated geochronology, are among the tools now being used to resolve intrabasinal correlation.