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Detection of Potential Hydrocarbon Traps in the Semliki Basin Using Gravity and Magnetic Data

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SUMMARY

Abstract
Identifying hydrocarbon traps is of critical importance to the petroleum industry. Proper identification of hydrocarbon traps and structures aid in mapping petroleum prospects and consequently contribute to drilling success. This research was aimed at qualitative and quantitative interpretation of gravity and magnetic data in order to disclose new constraints on basement controlled structures.

In order to detect hydrocarbon traps in the Semliki Basin, gravity and magnetic data were used to estimate the average thickness of the sediments within the Semliki Basin, to identify the fault systems around the Turaco Prospect and to identify basement controlled sedimentary structures within the Semliki Basin.

Bouguer correction had already been carried out on the gravity data while for the magnetic data, reduction to pole had to be done. The Bouguer anomaly and Reduced to pole data were gridded for analysis and interpretation. The derivatives that is, the First vertical, Total Horizontal, Tilt and Horizontal derivative of the Tilt derivatives were applied on the Bouguer anomaly and reduced to pole images so as to reveal the structures which could be the potential traps for hydrocarbons. The Analytic Signal algorithm was used to locate edges of magnetic anomalies so as to aid in estimating thicknesses of sediments. The Euler deconvolution method was implemented to estimate the average thicknesses of sediments and to identify major lineaments. Forward modeling was also applied on gravity data to identify potential trapping mechanisms in the Turaco structure.

The gravity data revealed a depocenter of approximately 5km which implied that the sediments were thick enough to generate hydrocarbons. The derivatives disclosed fault structures with the main faults being the Kibuku, Makondo, Toro-Bunyoro and Semliki faults. Using the Euler deconvolution, an average thickness of sediments in the range of 2-5km was observed. Forward modeling revealed that the Turaco structure is fault controlled and therefore, the identified faults could be the potential traps for the Turaco prospect.

It can therefore, be concluded that the main structures which could possibly be potential hydrocarbon traps in the study area are probably fault controlled.