GEOLOGIC STRUCTURE OF THE KETA BASIN, FROM INTEGRATED GEOPHYSICAL DATASETS

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ABSTRACT

Seismic, magnetic and gravity geophysical methods have been applied to the Keta basin to delineate tectonic structures, lithologic boundaries (contacts) and estimate depth to the basement. Four processing methods namely the edge detection techniques, located 3D euler deconvolution, 2D inverse modeling and fault interpretations were applied to the acquired data sets. Three edge detection methods (horizontal, tilt and 1st vertical derivatives) were applied to the magnetic data to delineate basement lineaments which were further interpreted as faults and lithologic contacts from a produced structural map of the study area. The general trends of the mapped faults were northeast-southwest, east-west and northwest-southeast.

Several basement faults were mapped with two of them considered as major fault since they run through the entire basin forming two fault systems. These were inferred to correlate with the Fenyi-Yakoe and Adina fault-systems established by Akpati (1978). Depth to magnetic source estimated from located 3D euler deconvolution showed non-uniform depth across the basin with deeper depths occurring to the south and east (>2000m) whilst shallower depth occupies the north and south-west (<1500m) of the study area. 2D inverse modeling of gravity data revealed depth and width of approximately 3.5km and 10.7km respectively for the Keta lagoon trough located at the eastern-most part of the basin. Fault interpretation from 2D seismic sections indicated that the onshore sedimentary succession may be characterized by both normal and reverse faulting whilst the offshore is dominated by step-like normal faulting. The mapped faults mostly dipped north/north-west in direction and appeared to be more intense along the narrow shelf than the offshore area. In terms of geometry, the Keta basin was inferred as a conical southward sloping opened basin controlled by basement flexures and fault systems.

Keywords: *Tectonic structures, Lithologic boundaries, Edge detection techniques, Euler deconvolution*