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GRAVITY AND MAGNETIC SIGNATURES, DERIVED CRUSTAL STRUCTRE AND TECTONICS OF SIRT BASIN, NORTHERN CENTRAL PART OF LIBYA

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The Sirt basin is located in the north central part of Libya within the bounder's 270N-330N and 160E-220E. This study involves analysis of gravity and magnetic data to delineate structures and faults and to locate any major structures. The produced Bouguer gravity map shows prominent NW-SE and N-NW trends. Isostatic residual map is characterized by a dominant NW– SE trend in the study area. This is clearly evident in the isostatic residual. The main trending anomalies are in the northern and southeastern parts of the study area with NW-SE orientation. A strong NW-SE trend is truncated by E-W trending in the southeastern and southwestern parts of the area. This is consistent with change of tectonic zones (Duronio and Colombi, 1983). The magnetic expression in the northern part of Ajdabiya trough is characterized by NW-SE trending structures which coincide with late Cretaceous structures of the Sirt basin, while the southern part is characterised by NE-SW trending features which coincide with a late Paleozoic trend (Goudarzi, 1970, 1980). The northern part of the Ajdabiya trough is separated from the southern part by a prominent NE-SW lineament that is expressed in both the gravity and magnetic data. It is interpreted as a basement fault, which separates a thicker southern crust from a thinner northern crust. The high gravity anomaly within the northern part of the Ajdabiya trough is interpreted as a result of mantle upwelling which caused thinning of the continental crust beneath the northern part of the Ajdabiya trough. The Total horizontal derivative results of Gravity and Magnetic data (Cordell, 1979) ,(Cordell and Grauch, 1985), 3D Euler Deconvolution of gravity and magnetic data magnetic anomalies produced features trending similar to the positions of tectonic and geological information from the Sirt basin. High gradient values delineate NNW-SSE to N-S and NW-SE trends which mark the faulted southwestern, southern, northern and central boundaries of the basin, respectively. New faults with orientations NNW-SSE trends along the southwestern flank of the Sirt basin and is truncated by E-W faults dividing it into segments. Strong N-S lineaments occur over the southern and central part of study area and are well indicated by the 3D Euler Deconvolution. From this study the 3D Euler Deconvolution provides very useful information of the rift structures. Predictive modelling (2-1/2D) of gravity profiles was carried out for northern and southern parts of Sirt basin. Two profiles were controlled by wells. The deepest part of the northern profile is in the Ajdabiya and Al Jahamah platform and approximately depth from 3-6km. The deepest part along the southern profile is approximately 4.88 km in the Zallah and Hameimat trough.

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