



Gravity study of Libya; Evaluation and Integration with Geological Data

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Libya is located on the Mediterranean foreland of the African Shield and covers an area of approximately 1.8 million square kilometers. Since Early Paleozoic time, Libya has been a site of deposition of large sheets of continental clastics and several transgressions and regressions by the seas with consequent accumulations of a wide variety of sedimentary rocks.

Several tectonic cycles affected the area and shaped the geological setting of the country. However, the regional geology and the structural framework have been highly influenced by the Caledonian, Hercynian, and Alpine tectonic events. As a result, a total of seven sedimentary basins, namely Ghadames, Murzuq, Al Kufra, Al Butnan, Sirt, and the Offshore Pelagian Basin, were developed and were separated by intervening uplifts and platforms (Gargaf, Tibesti, Nafusah and Cyrenaica platform). Apart from Sirt and the offshore basins, all the above mentioned basins are active since Early Paleozoic time and received several thousand feet of sediments.

The capability of providing regional information on the structure of sedimentary basins makes gravity mapping, in conjunction with geological information, potentially powerful tools. In this study we used gravity mapping as our primary tool of investigation however, we also used all available geological information to better understand the regional tectonics.

The gravity dataset that were used in the Gravity compilation project of Libya is not homogenous. As a result, some irregularities, apparent spikes or misties, and large shifts were obtained and were taken into consideration.

Evaluation of gravity Maps of Libya and their integration with geological data provide a better understanding of the role that gravity mapping plays in the geological exploration of sedimentary basins. Results confirm the known Sirt Basin regional tectonic elements and the possible presence of NW-SE lateral wrench tectonics, crossing Ajdabiya Trough at the center of Sirt Basin. The residual gravity map supports new interpretation of the Sirwal Trough in Northern Cyrenaica. Results also indicate shallow crust along the present day coast line of Al Jabal Al Akhdar, steeply dipping toward the offshore.

The depo-center of Ghadames Basin cannot be precisely defined due to the lack of gravity coverage. However, Murzuq Basin is well defined regionally, in spite of gravity gaps which make the overall coverage in the southern basins inadequate for precise interpretation.