



Gravity and Magnetic Study of Northeastern Libya

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The northeastern Libya consists of two distinct tectonic provinces; the tectonically unstable northern Cyrenaica and the more stable Cyrenaican platform to the south. The unstable northern Cyrenaica comprises the Al Jabal al Akhdar uplift, and the Dernah, Benghazi, and Butnan basins. The arms of the Sirt basin rift complex and its offshore extension of the Gulf of Sirt bound it to the west and south. To the east it extends into the Marmarica platform of the western desert of Egypt.

This study represents a detailed investigation that aims to focus on the structure and regional tectonic setting of Cyrenaica and adjacent areas through a comprehensive quantitative and qualitative gravity analysis. Although this study is primarily gravity and magnetic one, it incorporates other geophysical and geological information.

A gravity data base, collected from a variety of sources, has been compiled to generate the Bouguer gravity anomaly map that represents the basic map used in the overall interpretations, as well as in generating more specialized gravity maps used in the detail gravity investigations. The Bouguer gravity map demonstrates that the northern inverted basins of Cyrenaica and the coastal plain of Al Jabal al Akhdar show a rapid northward increase of the gravity values to up to 130 mgal at the tip of the promontory. The generated Total intensity magnetic map of Northeastern Libya confirms the gravity results.

Analysis of regional gravity anomalies provides a basis for modeling near-surface structures. In this study the various geophysical results were integrated with geological data to constrain a quantitative interpretation using a computer modeling routine. The depth information in the model was constrained by well data and the sedimentary

densities were estimated from well log analysis. A change in the crustal thickness of about 2 km is well pronounced. In addition a series of steep faults that separates the unstable Al Jabal Al Akhdar from the more stable Cyrenaica platform as well as other faults within the platform were well delineated.