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Geophysical and remote sensing techniques as tools for structural geological interpretation of Cyrenaica platform NE Libya

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The study area is located in the northeastern part of Libya between Longitude 20E to 25E and latitude 29N to 33N.It Belongs to two major tectonic units, the stable shelf (Cyrenaica Platform), and the unstable shelf which comprises Al-Jabal al Akhdar uplift, Darnah, Binghazi and Butnan basins, and subsided more rapidly than the stable platform throughout the Mesozoic time. The region is surrounded by the Mediterranean Sea to the north, the Egyptian plains to the east, the Al kufrah Basin to the south and the Sirt Basin to the south west. The Cyrenaica Platform is separated by E-W running "Hinge Line" from the unstable shelf. This "Hinge Line" is an E-W trending fault like lineament can be recognized on satellite image. We believe this feature to be large-scale linear structure that has control on the development of the Cyrenaica platform as a whole.The Palaeozoic sequence in the unstable part is deeply buried, the oldest formation reached by drilling in these part lies within the Jurassic. The late Jurassic-Early Cretaceous thickness in the uplifted block is of the order 4 km, these contrasts with their thickness of about 1km in the stable part of the Cyrenaica. The area is part of the African plate, which abuts the Apulian plate to form a continental block separating the eastern and western Mediterranean oceanic basins. The interpretation of the remote sensing data revealed a series of folds and circular in the uplifted part of the study area. The power spectrum analysis indicates the presence of at least three magnetic depth ensembles. The shallow ensemble extends over a wide spectral band (wavenumber 0.45-0.1) and is attributed to intra-sedimentary anomalies. The deep ensemble (wavenumber <0.03) is steep and of higher intensity than the shallow ensemble and is attributed to deep-seated basement rocks. The third ensemble is

shown between the deep and the shallow ensembles and most probably related to the transition zone between the uppermost basement and the intra-sedimentary rocks The Bouguer gravity map shows a large negative gravity anomaly in the centre of the Cyrenaica Platform while the unstable shelf characterized by positive gravity anomaly. The regional gravity trend consists of a smooth gradient with gravity increasing seaward to the north, the source of this regional gravity gradient is interpreted as a seaward shallowing of the Moho. Gravity values on regional surface generally increase in a regular manner from the south to the north as a result of a major density/structural change in the lithosphere marking the transition from the continent to the ocean. The analysis and interpretation of the geophysical and remote sensing data revealed two sets of linear anomalies. The first set of anomalies is trending north westerly and closely associated with the prominent, structural trends in the area. The second set is trending north-East which is less prominent and probably older in geological age than the first set.