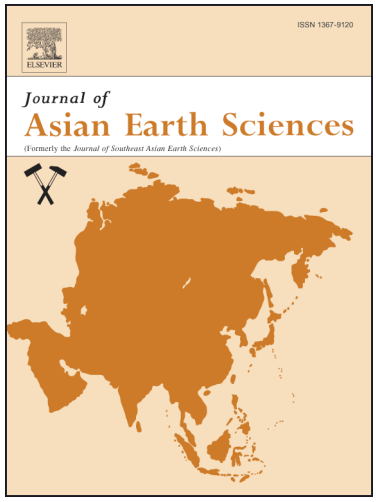

Full length Article

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The thickness of cover sequences in the Western Desert of Iraq from a power spectrum analysis of gravity and magnetic data

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ABSTRACT

The Western Desert of Iraq is part of the stable shelf region on the Arabian Plate where the subsurface structural makeup is relatively unknown due to the lack of cropping out rocks, deep drill holes and deep seismic refraction and reflection profiles. To remedy this situation, magnetic and gravity data were analyzed to determine the thickness of the Phanerozoic cover sequences. The 2-D power spectrum method was used to estimate the depth to density and magnetic susceptibility interfaces by using 0.5^{o} square windows. Additionally, the gravity data were analyzed using isostatic residual and decompensative methods to isolate gravity anomalies due to upper crustal density sources. The decompensative gravity anomaly and the differentially reduced to the pole magnetic map indicate a series of mainly north-south and northwest-southeast trending maxima and minima anomalies related to Proterozoic basement lithologies and the varying thickness of cover sequences. The magnetic and gravity derived thickness of cover sequences maps indicate that these thicknesses range from 4.5 to 11.5 km. Both maps in general are in agreement but more detail in the cover thicknesses was determined by the gravity analysis. The gravity-based cover thickness maps indicates regions with shallower depths than the magnetic-based cover thickness t map which may be due to density differences between limestone and shale units within the Paleozoic sediments. The final thickness maps indicate that the Western Desert is a complicated region of basins and uplifts that are more complex than have been shown on previous structural maps of the Western Desert. These basins and uplifts may be related to Paleozoic compressional tectonic events and possibly to the opening of the Tethys Ocean. In addition, petroleum exploration could be extended to