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An integrated geophysical study wajid formation of water-bearing aquifers: Case study at Wadi Aldwasir area-Saudi Arabia

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Wadi Aldwasir area is very important province in Saudi Arabia. It contains the main water aquifer that attains a proven groundwater reserve (Wajid aquifer). This study aims to investigate the subsurface features of this aquifer (thickness, depth to basement, overlying section and the structural elements) using an integrated gravity survey (2D profiles) and aeromagnetic interpretation (RTP, low pass and high-pass maps). Gravity data are measured in the field using CG-5 AutoGrav, while magnetic data are taken from a survey made by Saudi Geological Survey. The interpretation of aeromagnetic data revealed structural elements trending towards N-S, NNE-SSW, WNW and NNW-SSE directions. Positive magnetic anomalies are found indicating the presence of anticlinal blocks and strike-slip fault patterns. These structural elements are associated with the prevailing Najd fault and the transform fault systems. Gravity data showed that the depth to basement vary from 600 m to 1150 m, giving rise to a considerable range for aquifer thickness of 250 m to 700 m. Local basins of good thicknesses are indicated. Finally, a basement relief map is conducted based on an integrated interpretation of the magnetic and gravity outputs. It shows an increase of depth from south to north (good aquifer thickness).