
Integrated Geological and Geophysical Methods to Map Subsurface Contact between Ultramafic and Carbonate Sequences in Al Wadiyein, Buraimi, Oman

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An integrated geological and geophysical investigation is being carried out in Al Wadiyein, 5 kilometers east of Buraimi, at the western edge of the northern Oman mountains. The area studied to date includes ultramafic rocks (Semail ophiolite) exposed on the east side of the wadi and allocthonous recrystallized carbonate exposed on the west side.

The aim of the investigation was to detect and map the subsurface contact between the ultramafic and carbonate rocks and to establish the geometry and orientation of the contact. The investigation included geological mapping, gravity, magnetic and seismic survey. In addition, rock samples were collected and analyzed to obtain densities for the gravity modeling.

Preliminary results indicate that the geophysical methods have proven to be valuable tools in evaluating the geological setting of the area. The gravity anomalies gradually decrease towards northwest from a high near the outcrops of ultramafic rocks to low over the carbonate rocks. The magnetic anomalies reveal lineations that are oriented northeast-southwest, perpendicular to dip direction of the gravity trend. This data is interpreted to represent northeast-southwest faults along the northwestward dipping contact between the ultramafic rocks and the carbonates. Seismic reflection and refraction data have imaged the top layer of the ultramafic sequence and constrained the gravity models.

Based on this, we deduce that the model that best explains both geological and geophysical data is a model where the ophiolite has a wedge-shape structure that thins to the northwest as it dips under the carbonates.
