PREDICTING GOLD MINERALISATION: USING GEOPHYSICS AND PETROPHYSICAL CHARACTERISTICS TO MAP PROSPECTIVE STRUCTURES UNDER COVER

MINEX CRC PROGRAM 3

National Drilling Initiative

PHD PROJECT

Monash University

PREREQUISITES AND INTERESTS

Geophysics, petrophysics, structural geology, 3D modelling

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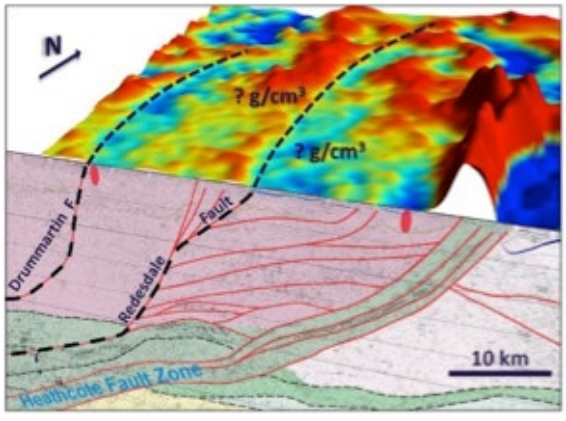

Figure: Reflection seismic and gravity highlighting deep crustal structures associated with orogenic gold mineralisation in the northern Bendigo Zone, central Victoria.

RESEARCH PROJECT

Orogenic gold occurrences in north-central Victoria are spatially associated with mapped structures (faults) at surface. These crustal scale faults, imaged in deep reflection seismic data, provided conduits for gold bearing hydrothermal fluids, transporting gold from volcanic dominated lower crustal sources and concentrated it in upper crustal mineralisation hosted within Ordovician turbidite sequences.

These structures produce a gravity response which can be traced north along strike, beneath younger Murray Basin sediments. Thus, gravity data provides a key exploration tool for the identification of regions prospective for gold mineralisation analogous to the systems that have produced the world-class Ballarat, Bendigo and Fosterville deposits. Little is understood as to the source of gravity anomalies related to these structures, particularly given minimal lithological variation between the hanging- and foot-walls in the turbidite packages.

This project would focus on researching the gravity response associated with these faults and deriving an explanation for their existence by investigating the petrophysical properties of basement turbidite sequences deformed by the structures, and/or the role played by topographical variations in the basement-cover interface. Project scope would including the acquisition and analysis of new petrophysical data to supplement existing measurements, and applying results to the modelling and inversion of gravity data (potentially including existing Airborne Gravity Gradiometry data) within a regional geological context enriched by existing mapping, geophysical data (including reflection seismic, aeromagnetic and limited AEM data) and 3D geological models.