Interpretation of seismic, gravity and MT in the southern Mount Isa Province

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Overview

• Background

• Seismic and gravity

• Seismic and MT
Project area

• Poor history of exploration success

• Basement within explorable depths

• Greenfields exploration area

basement depth model from de Vries et al., 2006
Uncover ethos

1. Characterising cover
2. Lithospheric architecture
3. 4D geodynamic and metallogenic evolution
4. Distal footprints

McCuaig and Hronsky, 2014
Uncover ethos

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McCuaig and Hronsky, 2014
Regional trends - Basement

- N-S magnetic strata
- Along strike from major deposits (?)
- Major crustal boundaries (?)
Open questions and available data

• Deep structures?
• Cover depth?

• Deep crustal seismic data
• Magnetotelluric data

• Seismic + gravity
• MT + seismic
Current understanding

Various models

Potential terrane boundaries

Major features:
- Western Mount Isa boundary (?)
Current understanding

Various models

Potential terrane boundaries

Major features:
- Western Mount Isa boundary (?)
- Gidyea stuture 1740 Ma (?)
Seismic project aims

- Continuation of large-scale features undercover
- Western extent of Leichhardt/Mount Isa superbasins
- Major structures
  - Seismic interpretation and gravity modelling
- Model

=Observed, =Calculated, =Error 1.683

60 km

Rufus, Pilgrim, Overhang, Cloncurry, Gidyea SZ, Cork
Features

Difference in bulk crustal properties across GSZ

Bland lower crust

Recent reactivation along Cork Fault

Defined shallow Moho
Features

GSZ complex/deformed

No evidence of east dipping detachment
Features

Thickened crust
Change in crustal fabric
Deformed reflective lower crust
No evidence of change across Rufus Fault
Additional insight from MT data

Basement depths – not discussed

Alteration/targeting

Broad trends
MT vs Seismic

Conductive feature associated with faults
Present below ~12 km
hallmark of H+
Resistive to the east
Combined understanding

Shallow anomalous density

Deep penetrating faults associated with alteration

Orange unit interpreted to be ECV equiv.
Broader trends

Resistive central belt

East – CCA

West – suggested decrease in resistivity

AusLAMP
Take home points

Integration of different geophysical techniques is key in poorly understood areas

Thickened crust and suturing present near Pilgrim Fault

Gidyea Suture Zone present in southern Isa

Seismic, gravity and MT together suggest alteration of deep penetrating structures in the southern Mount Isa Province