

predictive mineral discovery COOPERATIVE RESEARCH CENTRE

CRC

Digging Deeper with "Worms": Finding Structure in Geophysics, Mount Isa Eastern Succession

Brisbane Onto Br

^ Figure 1: Mount Isa Eastern Succession.

Austin, J. R.
School of Earth Sciences, James Cook University, Townsville, Australia 4811

1. Great Source of Ore: Source of Great Confusion

Mylonitised gabbro GR 04738 76533

Mineral deposits were discovered in the Mt Isa Inlier 70 years ago, but the tectonic history remains hotly debated. Debate may stem from different authors trying to solve the same problem using different methods and local observations becoming regional scale assumptions. The widely adopted, D1, D2, deformation nomenclature is another source of confusion. It is applied to different areas, variant versions of it are used, and new "D" sequences are introduced. *Indeed there is no conclusive evidence that deformation is consistent across the major structural units and many tectonic models don't correspond to better understood analogues*. O'Dea & Lister (1994) suggest "that variations in structural history reflect different mechanical responses to the same deformation event". But perhaps an integral piece of the puzzle has been overlooked. "Worm" magnetic data acquired over the Eastern Succession reveal a major, "deep" structure, whose surface expression is proximal to a zone of mylonitisation and brecciation-the Cloncurry Lineament.

The aim of this project is to understand this structure and its context in the tectonic history.

> Figure 2 graphically identifies event histories proposed by various authors to better understand the critical arguments within the literature. Wide debate of the tectonic history may stem from authors' different viewpoints, interests and references and it justifies further investigation into the tectonic history of the Mt Isa Inlier.

The Cloncurry Lineament Figure 3 Legend

Ernest Henry
(Au,Cu)

Cloncurry Fault
Cloncurry Lineament
Great
Australia
(Au,Cu)

(Au,Cu)

(Au,Cu)

Cloncurry Lineament
Unmagnetised Fault

Eloise (Au,Cu,Ag)

Maranoan

(Pb,Zn,Cu)

Pb,Zn,Cu)

Saxby

Granite

Mt Kalkadoon (Cu) Area Fairmile

Landsborough (Cu)

Squirrel Hills

Granite

Dingo (Pb,Zn,Cu)

Marramungee

Cannington 🔏

(Pb,Zn,Cu)

Mt Angelay

Granite -

Weak Lineation

Dolerites

Granites

Quaternary

Cenozoic

Jurassic

Breccia

Massive

Undifferentiated

Llewellyn Ck Fm.

Toole Creek

Volcanics

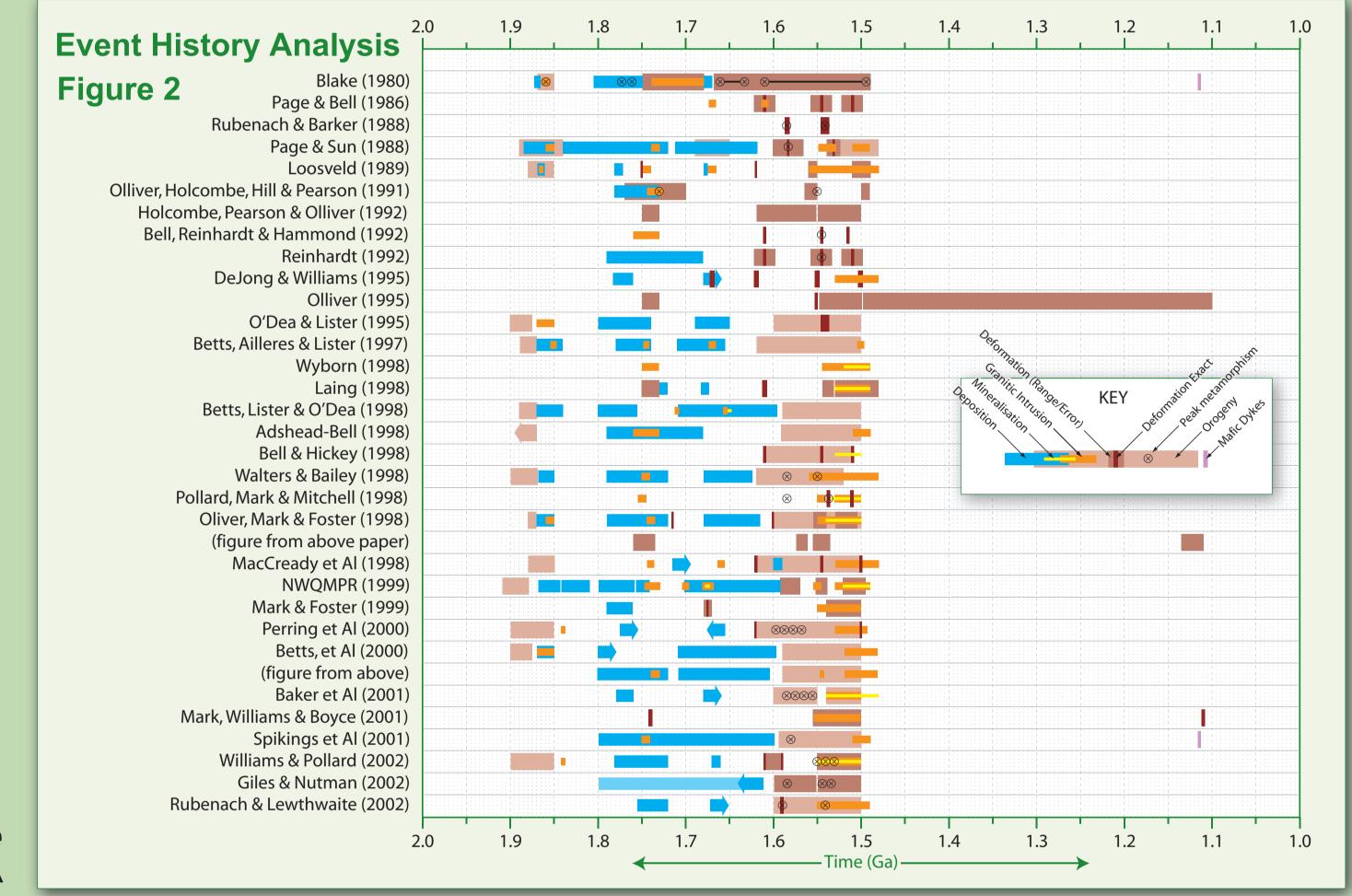
Phanerozoic

Doherty Fm.

Soldiers Cap

Intrusives

Breccia in the gorge GR 04731 76534 ^



2. What can "worms" dig up?

< Figure 3 shows the Cloncurry Lineament (or worm) at an upward continuation (UC) of about 40 km and its geological context, in the Eastern Succession. Lower levels of UC correlate well with the Soldiers Cap and Doherty Fm's contact but in other places it's nature is obscured by late granitic intrusions and complex faulting. While the so called "deep" lineament is well defined its near surface expression is clearly not. This project will evaluate the nature of this contact via intensive field mapping, remote sensing and geophysical comparison.</p>

> Figure 4 Identifies surface lineations in the initial study area as a means of assessing the likelihood of tracing mylonitised zones along strike. The thick grey lines correspond to worms with a UC of 20 km, and align with lineations shown in red. *Mylonitised rocks have trends of NNW and NNE that only show up over short distances* due to the complex nature of late faulting. The lineament more probably defines a major contact of magneticly contrasting lithology e.g., the Soldiers cap / Doherty Formation contact. *It seems unlikely that the lineament is linked only to mylonitisation but also to spatially associated brecciation.*The lineament may also correspond to factors relating to granitoid intrusion or associated magnetite veining. A detailed study of the magnetic susceptibility of these units will constrain these potential sources of magnetic contrast.

1:50,000 Geology of the Fullerton Gorge Area:
Lineations Derived by Aerial Interpretation

Figure 4

Pgia (on map)

Pgia (on m







"What better place

gorge full of breccias

and mylonites" -TGB

< GR 04727 76536

to be a structural

geologist than a





Geoinformatics Exploration Australia are thanked for providing worms