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# **The Paroo Fault and the Mount Isa copper orebodies; a revised structural and evolutionary model, Mt Isa, Queensland, Australia**

**Thesis submitted by  
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**for the degree of Doctor of Philosophy  
in the School of Earth and Environmental Sciences at  
James Cook University of North Queensland**

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## Statement of Contributions

General contributions towards this study have included:

- Xstrata Community Partnership Program, North Queensland
- ARC linkage project, “From exploration to mining: new geological strategies for sustaining high levels of copper production from the Mount Isa district”

Contributions to the manuscripts within this thesis have come from:

- Section A – Associate Professor Thomas Blenkinsop and Professor Nick Oliver are thanked for editorial support as co-authors of this paper.
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## **Abstract**

Numerous studies on the Mount Isa copper orebodies have assumed the role of the Paroo Fault, which has juxtaposed the Mount Isa Group against the Eastern Creek Volcanics, and forms a footwall to the copper and lead-zinc-silver orebodies. The copper orebodies have largely been considered to have formed during east northeast-west southwest shortening, late during the 1590-1500 Ma Isan Orogeny. This thesis examines the Paroo Fault from the km-scales to the sub mm-scales in order to understand its development and role in the mineralisation of the copper orebodies. Recent techniques such as Gaussian Curvature analysis, fold profile analysis, dilation and slip tendency analysis, spanned length analysis as well as established techniques such as thickness analysis and geological mapping have been used to examine the km-scales geometry of the Paroo Fault. This has led to a new proposed timing for initial reactivation of the Paroo Fault during the final stages of deposition of the Mount Isa group, followed by folding during east-west shortening and refolding during east northeast-west southwest shortening. Detailed geological mapping of the Paroo Fault Zone at 10s of m-scales supports the conclusions drawn from the macro-scale observations and suggests a new interpretation of the timing for the formation of the copper orebodies, before or early in the east-west shortening event, at Mount Isa. Re-examination of the mapping database collected by mine geologists (MIM and Xstrata Copper) has demonstrated that at the hundreds of metres scale, folds formed during the east northeast-west southwest shortening bend around the copper orebodies, indicating that the copper orebodies formed earlier than this event, consistent with conclusions drawn from the mapping of the Paroo

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