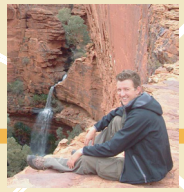
Preliminary U-Pb zircon dates from quartz-sealed fault zones at Mount Isa



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Introduction, aims & objectives

Faults are considered an integral part of ore forming systems. The region surrounding the post-orogenic copper orebodies at Mount Isa is dissected by numerous silicified regional-scale fault zones (Figure 1). It is now thought that zircon growth may accompany (hydro-) thermal episodes that are characterised by low temperatures (e.g., Dempster *et al.* 2004). So, the laser ablation ICP-MS U-Pb technique was applied in order to date zircons that may have formed during silicification (refer to Black *et al.* 2004; Jackson *et al.* 2004).

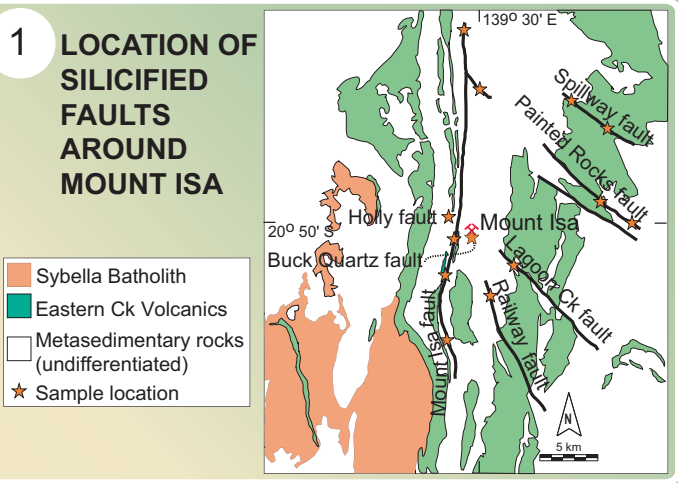
Results

Zircons are present in accessory amounts (<1%) in the majority of quartz samples, range from *ca.* 20 to 250 µm in diameter, are generally subhedral and clear with few inclusions and show variable degrees of fracturing (Figure 2). Back-scattered electron and cathodoluminescence zircon images demonstrate that some zircons may have experienced multiple growth stages (Figure 2). The data demonstrate variable concordant behaviour and yield a wide range of $^{207}Pb/^{206}Pb$ dates from *ca.* 1750 Ma up to 3000 Ma (Figure 3). These ages are older than would be expected if they were to represent new hydrothermal zircon growth during fault dilation. They are also older then the majority of rocks that host the silicified faults. The ages appear to be sourced from a combination of the Barramundi Basement and the Eastern Creek Volcanics.

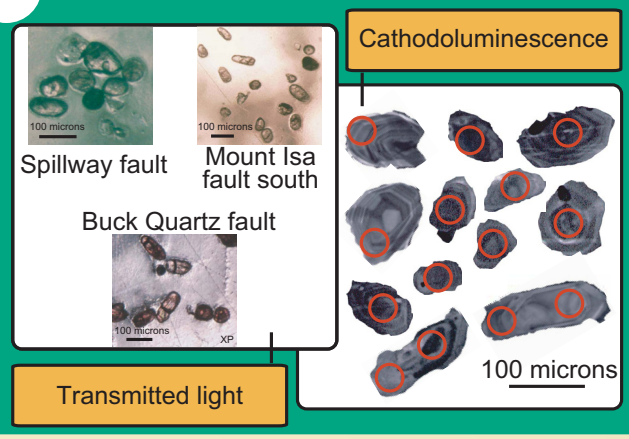
Implications

This data could be explained by zircon inheritance from the wallrock during the silicification process. However, suitable wallrock ages are not represented in the data. Potentially, this suggests that the zircons were entrained and transported by a fluid from the basement units. This would implicate a deeply-sourced fluid component was involved in the main post-orogenic silicification process in the majority of faults. Recent work on fluid sources for the Mount Isa copper deposit concludes that at least a portion of the likely mineralising fluid was equilibrated at depth with the metamorphic basement (Kendrick, this volume). Silicification could represent the regional expression of this fluid along regional-scale fault zones. Further work will hopefully provide further constraints on the fluid(s) related to this silicifcation.

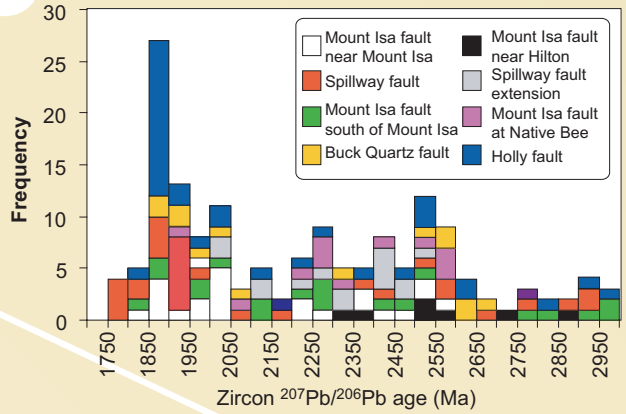
1 LOCATION OF SILICIFIED FAULTS AROUND MOUNT ISA



2 ZIRCON IMAGING



3 HISTOGRAM OF ZIRCON AGES



References

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Kendrick MA (2006) Noble gas and halogen constraints on the origin of ore fluids: Examples from the Mt Isa terrain. In: abstracts of the Predictive Mineral Discovery: Science at the Sharp End Conference, Perth, April 2006.

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